IN THIS ISSUE: Power Applications in Western Industry

JOURNAL OF ELECTRICITY

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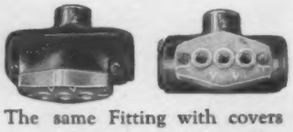

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JOURNAL OF ELECTRICITY

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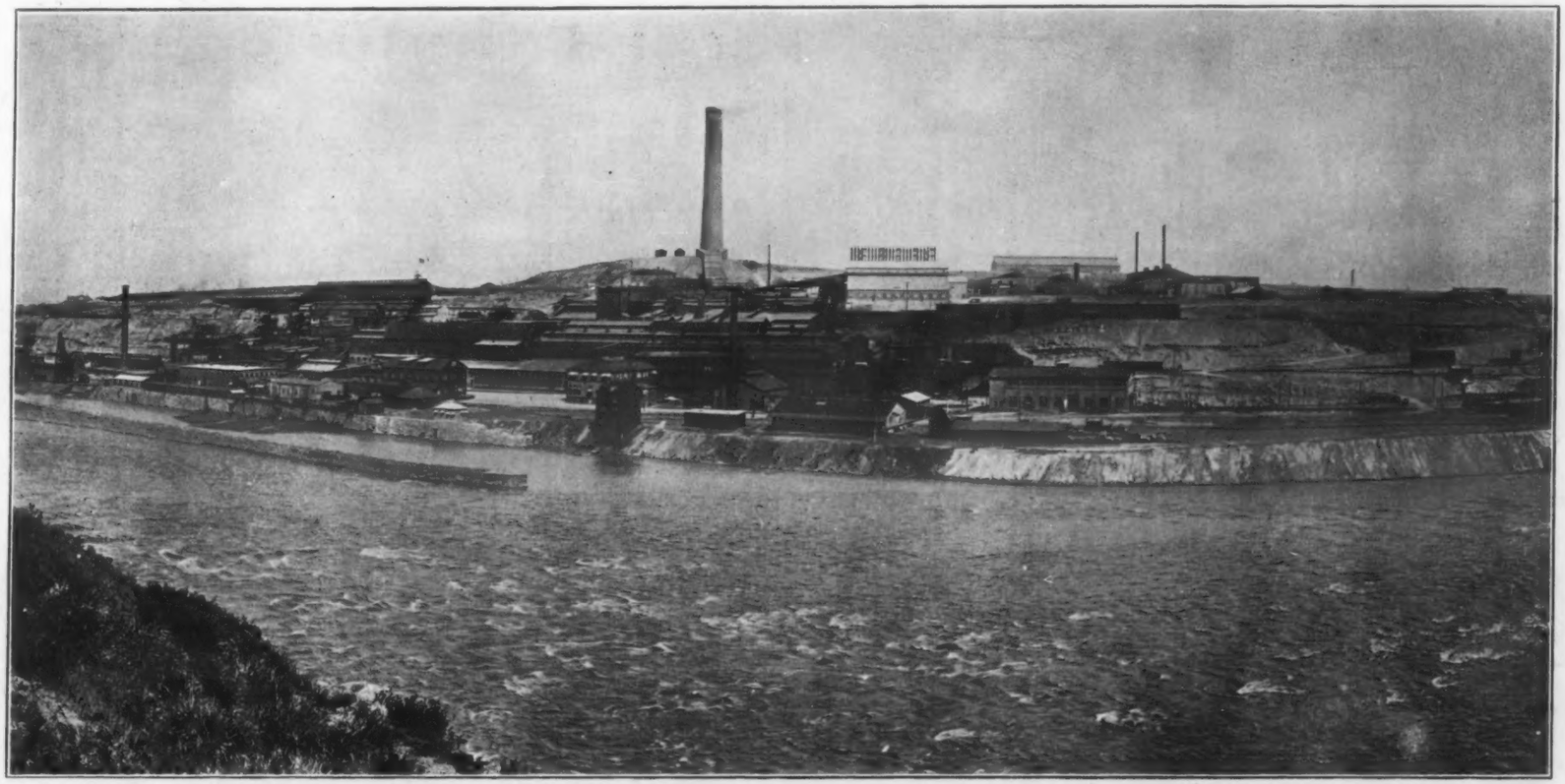

THE WEST LEADS IN THE SMELTING INDUSTRY

During the past year 2,300,000 tons of copper ore were treated at the Anaconda smelter in Montana, resulting in the production of more than 57,000 tons of copper and of $8,220,000 worth of gold and silver as a by-product. The daring and foresight that led to the establishment of this industrial achievement, in which electrical energy plays such a prominent part, have made it a fitting monument for the West. It is illustrative of the great dreams that are being expressed in material form, and are making the West, with its forty million undeveloped water horsepower, the logical industrial center of the world.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 45 SAN FRANCISCO, SEPTEMBER 15, 1920 Number 6

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The Eternal Question of Private *versus* Public Ownership

An Editorial

The necessity of municipally owned power plants as well as privately owned power plants rendering their accounts to the public in a standard form becomes daily more emphatic. The Journal of Electricity, at the recent Pasadena Convention of the National Electric Light Association, was commended in the highest terms for its national questionnaire published in its issue of May 15th concerning definite reports from the forty-eight states of the Union in regard to this important point. This commendation, coming as it did from the Public Policy Committee of that great Association, adds emphasis to this necessity of the hour.

That certain citizens of towns having municipally owned street car or lighting and power systems are suspicious of the ability of that system to earn a fair return on the money that they as citizens have invested, is evidenced by the attitude of the daily press in those cities. Scathing editorials have appeared in Seattle, San Francisco and Los Angeles papers questioning the balance sheets and reports given out by the municipal officials regarding the earnings and expenses of the municipal systems in those towns. An editorial recently appeared in the Seattle Post Intelligencer entitled "Why Not Be Truthful?" which indicted the Seattle Lighting Bureau on the ground that its previous reports to the public had indicated no deficit and therefore no necessity for the present raise in rates. The Municipal Railway of San Francisco is accused of giving a false impression of its prosperity through a failure to include certain items in its fiscal statement which are required by the law of the privately owned company. In calling attention to these things the Journal of Electricity does not wish to impugn the character of the respective city departments but merely to bring before its readers the necessity for an equal basis of comparison.

This journal has in the past had little to say regarding the relative merits of privately owned as opposed to municipally owned power plants, but insofar as standardized forms of keeping accounts and a just and reasonable comparison of statistics of operation are concerned it has been most emphatic in past issues; and now again wishes to place itself on record as urging all sides to the issue, in a spirit of fair play, to get together on some common basis of comparison of costs. The most direct and simple method would seem to be to empower the regulating commissions of the various commonwealths to superintend such standard forms of accounts, both for municipally owned as well as privately owned systems, as are required for privately owned utilities, and in a measure has been acquiesced in by the municipally owned utilities in California under the guidance of the California State Railroad Commission.

Without certain standardized comparisons, camouflage and all sorts of subterfuges become possible, and misrepresentation of facts to the public should not for a minute be tolerated. Take for instance, some of the particular points at issue that become confused where no standard of comparison is possible. Even though a municipality could show a lower rate per kilowatt-hour to the consumer than that charged by a private utility, the question of service in territories surrounding the city and upon which the city depends, must also be taken into consideration. In practically all our cities in the West the prosperity of these centers of population depends upon the production of the surrounding country, and the production of the surrounding country depends largely upon the service rendered by the power company. The grocer, the lumberman and others might save a few dollars per month on account of a lower electric rate within a municipally operated territory, assuming that a lower rate were possible under municipal operation; but unless the territory outside that city were served with power sufficient to continue its development those same business interests would suffer a loss in far greater amount of income from this outside business than they would gain in the saving of power.

Take another point that is well worth considering: In the commonwealth of California a corporation tax of 5.6% is now being paid by a private utility that is not being paid by the municipally owned utility. As a consequence, as municipally

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Western climate means good working weather for twelve months of the year.

FORWARD WESTERN INDUSTRY!

owned power plants continue to increase the tax will automatically fall upon the rural districts in communities not served by municipally owned plants. A municipality owning its utility by reason of not paying this corporation tax, can reduce its rates to the consumer within that municipality and this additional burden will be loaded upon the farmers and communities being served by private utilities. As statistics show that one farm at the present time is supporting two families in town, it would seem that the farmer is now doing his part without assuming this additional burden which is without justification.

If the city of Los Angeles wishes to sell power to the Goodyear Rubber Company at a figure so low that no one else can outbid her in order that she may land this industry, surely no one else will deny her the right to subsidize industry; but at the same time it is not fair to camouflage the issue and make it appear that this power is being sold at a profit and thus compromise privately owned power companies serving similar communities in the West.

Many other specific instances may be cited in comparisons of this nature, but the main point that it is desired to drive home in this editorial is that by all means a standardized system of accounting, equitable to both privately owned and municipally owned utilities under the direction of a state regulatory body, is beyond the question of a doubt the fairest way to procure unbiased and sane information on this subject, and it is to be hoped that all parties to the issue will join in this movement, voiced by the Journal of Electricity in its issue of May 15th, and see to it that proper laws be instituted in the various commonwealths of the country to bring about this much desired status of affairs.

Publicity and the Development of the West

The program of the Northwest Electric Light and Power Association's convention, recently held in Spokane, Wash., containing as it did two addresses before the public, one to the citizens of Spokane and the other to the Spokane Advertising Men's Club, brings forcibly to mind the necessity of telling the public the big part that has been played in the development of the West by the electrical industry. The report of the Water Power Development Committee presented at the Pasadena Convention of the N. E. L. A. and printed in full in the May 15th issue of the Journal of Electricity should be studied by every member of the electrical industry and the facts contained therein presented to the general public at every available opportunity. The romance of the daring projects conceived and put into operation by the engineers of the West should be brought out, and the confidence that the men of the electrical industry have in the future of the West, should be shown by telling of the vast sums of money which they are preparing to spend in hydroelectric construction in the next decade. Picture to the public the huge industrial centers which will spring up in the West as the result of the great blocks of cheap power available, contrasting this with conditions in the East, where plants are now facing the rising cost of fuel oil and coal. Visualize the benefits which the West is to receive from these great projects and bring home forcibly the idea that the development of the West is coincident with the development of its hydroelectric resources. Sell the idea to the public so that when their cooperation is needed it will be readily given.

Optimism Over New Industries For the West

The Journal of Electricity, the exponent of the West, cannot refrain in passing from commenting upon the optimism that prevails throughout the West over the advent of new industries and the outlook for the future. Perhaps no single incident has brought this thought more before the analytical mind of the public than that of the recent increase of freight rates and its possible effect upon the West. Slowly but surely the conviction grows that these increases will tend emphatically to give impetus to new industries throughout the West. Raw products at home will be manufactured into the finished product or shipped East or across the Pacific to Oriental and Pan-Pacific ports in the finished form in order to save in the cost of production.

Fundamentally, too, the conviction grows that industry has a brilliant outlook in the West due to the vast possibilities of hydroelectric development, 70% of the nation's undeveloped water power being located west of the Rockies. The excess of raw products prevailing throughout the West also adds impetus to possible new industries. Add to this a climate that makes possible a number of working days combined with housing conditions of the best type and a labor market at least no worse than elsewhere, and there are sufficient reasons to convince those who know, that never before in its history was the outlook better in the West for the early advent of new and important industries.

Great Western Power Company's Bond Sale

In our last issue there appeared an account of a drive for three and a half million dollar sales for the Great Western Power Company. The interesting part of this situation is the fact that although this company has in the past made little effort to market local securities practically the entire issue will be sold in central California. The people of this district are each day becoming more and more convinced of the fact that the state itself will progress no faster than its hydroelectric development, and as a consequence these great utility companies with stock securities offer one of the soundest investments on the market today, and there is great confidence that the regulating commission is being backed up by the people themselves, in the thought that these utility companies, closely guarded and regulated as to efficiency and rate-granting authority by public commissions, should, when faithfully performing their duties, be given a wholesome and generous treatment.

Research Work Needed on Transformer Oils

The growing tendency in the West looking toward the uses of higher voltages makes imperative research work connected with transformer oils. That one company has already placed an order for transformers with a voltage capacity of 220,000 makes this need even more emphatic. The dielectric strength, viscosity and other qualities of transformer oils should be given unusual study, since upon the efficient operation of these auxiliaries for transformer service will depend much of the future of high voltage transmission. It is to be hoped that research along these lines will be undertaken by both the American Institute of Electrical Engineers in its western sections as well as the Engineering Committee of the Pacific Division of the National Electric Light Association.

Electric Pumping Survey in Montana

Several successive dry years have brought the state of Montana face to face with the realization that its agricultural prosperity is dependent, as is that of so many other districts of the West, upon irrigation. As in other districts of the West, also, this means gravity irrigation supplemented by electric pumping, a condition which has made the agricultural load of the West one of such primary importance. So pressing is the condition in Montana at the present time, that the Public Service Commission of that state is setting aside all work that it can in order to make an irrigation survey of the state which shall be the basis for a state and national appropriation next year to cover irrigation needs. Montana already is one of the foremost users of electricity through its mines and the railway electrification in which it has been a pioneer—and present indications are that it will soon take its place among the agricultural centers as well.

The Insistent Search For New Fuel

The vital question of the shortage of fuel oil and coal which is now of nation-wide interest is bringing about economies in the saving of fuel which were unthought-of a few years ago. The convention of the Northwest Electric Light & Power Association recently held at Spokane, Washington, brings forcibly to mind the unique method of conserving fuel used by the Washington Water Power Company's steam plant at Spokane where for some months the excess power of the company to the extent of 5000 kw. has been utilized to heat the feed water for this plant. Another example of the insistent search for new fuel is seen in the news dispatch that the San Joaquin Light and Power Corporation has broken the ground for its new natural gas-burning steam plant in Kern country near Buttonwillow.

Economies in steam station operating practice on the Pacific Coast have been practiced for some time. At Seattle the municipal plant has been equipped to operate under fuel oil supply, but the boilers and furnaces have been placed in such a way that an easy change-over back to coal may be effected. The Puget Sound Power and Light Company has, during the last year or two, been making exhaustive studies in the subject of how to use pulverized coal and seems now well on the way to successful results. At Portland the Northwestern Electric Company has made use of a steam pressure approximating 250 lb., and at the same time is taking advantage of the refuse from lumber mills by the installation of a hogged fuel plant that is proving unusually efficient in operation. The Portland Railway Light & Power Company is proving equally successful in the use of this new type of fuel.

In central California the two large steam power plants of the Pacific Gas & Electric Company, one in Oakland and the other in San Francisco, in order to improve, have installed special metering facilities, thus bettering their daily operating conditions by economy in the use of fuel oil. At Bakersfield the steam power plant of the San Joaquin Light & Power Corporation has changed over entirely to operation by natural gas which, of all fuels, proves easiest of application, not excepting fuel oil. Farther down in the south in the Redondo plant of the Southern California Edison Company a complete overhauling of boiler room equipment has taken place, and again at the Long Beach plant of this company the installation of metering facilities has materially improved the average operating efficiency.

Over in Arizona the New Cornelia Copper Company at Ajo has, by means of the installation of automatic regulators for fuel oil supply, effected the saving of from 3 to 4 per cent in operating economy, while at the station of the Arizona Power Company at Phoenix, Arizona, the high records in fuel oil and boiler efficiency of 333.3 kw-hr. generated per barrel of oil used has been established.

The statement made by the Hon. E. O. Edgerton, president of the California Railroad Commission, before the N. E. L. A. Convention in Pasadena last May, that power companies should be allowed a bonus for increased efficiency in their plants will give the power companies an unusual incentive to increase their efficiency. If this policy is adopted by the regulatory bodies throughout the nation, it must surely result not only in an increased efficiency in all power companies and a consequent saving of fuel, but it will lead to a closer study of the problems which now confront every company using fuel of any sort in the development of its power.

Constructive Action on the Labor Problem

The United States Chamber of Commerce has taken a really constructive action in expressing its opinion of a compulsory arbitration of all labor troubles which may arise in the operation of public utilities. The recommendation, which was carried by a vote of 1,564 to 97, reads as follows:

> "The committee recommends that strikes by employes of all public service corporations performing public service essential to the lives, health, security, comfort and well-being of the people should by law be explicitly prohibited."

Industrial development means a new market in the West for electrical equipment.

FORWARD WESTERN INDUSTRY!

It was further recommended that suitable tribunals be created by law to adjudicate differences between employes and employers and that the decision of such tribunals be final and binding upon all parties.

This action is a refreshing attempt to consider the labor problem at a time of peace and in the interest of its permanent solution, other than as the mere settling of an individual situation. The electric light and power industry on the whole has not been bothered with labor troubles, and in general the spirit of its employes has been one of cooperative service which in itself was a guarantee against strikes; but it must not be forgotten that labor could tie up a city in British Columbia not so very long ago so that it was cut off from light and transportation for several hours, that both northern and southern California have suffered from electrical strikes within the last ten years, and that the entire labor situation is at the present time in a state of more or less restless uncertainty.

It is all very well for the power company to make sure that it is in the right and then win whatever strikes may occur through superior staying powers and the carefully guarded sympathy of the public—but like war, it is better not to have a strike than to win one. The time to worry about mending the roof is when it is not raining—and the labor problem is best handled when it is not acute. What is needed on the labor problem is a little constructive thinking and action in the present which will forestall trouble in the future—and in this the United States Chamber of Commerce seems to be taking a lead which is worth following.

Electric Storage Batteries in Driving Tunnels

Much interest has been attracted toward the use of the electric locomotive both in the Hetch Hetchy development of the city of San Francisco and in the driving of the Kerckhoff tunnel of the San Joaquin Light & Power Corporation Particular emphasis may be placed upon the possibilities of the electric storage battery and the electric locomotive in tunnel driving as instanced in the recent completion of the San Joaquin development known as the Kerckhoff project. Here the tunnel was of such proportions that the use of the steam shovel within the tunnel found its first application in the modern driving of tunnels. The electric locomotive supplemented the steam shovel activities by carrying the burrowings from the work into and out of the long tunnel as fast as the shovel could handle it. By the installation of the storage battery, however, upon the locomotive, certain extended uses of the locomotive were made possible. For instance, in the overhaul as the steam shovel progressed in its work there was not always time to extend the use of the regular trolley system, and as a consequence the storage battery proved of great assistance. Indeed, one of the outstanding features of this tunnel development proved to be the expedition with which material was taken from the tunnel, to which the electric locomotive and the use of the storage battery contributed in no small degree.

In view of the large hydroelectric development now going on in the West and the possibility of extended tunnel driving, the storage battery will unquestionably prove of increasing helpfulness.

WHAT IS HAPPENING

in the Electrical Industry in the Northwest, as brought out at the convention of the Northwest Electric Light & Power Association in Spokane, will be featured in the Northwest Convention Echo number of the Journal of Electricity, October 1st. Full reports of the papers, discussion, entertainment, will serve as an indispensable record if you attended convention, and a welcome consolation if you had to miss it.

Ice Making in the San Joaquin Valley

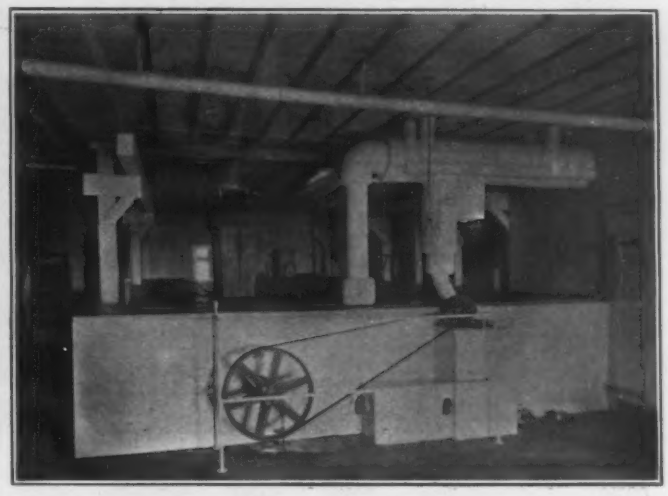
BY J. M. BUSWELL

(The productivity of a fertile district is neutralized unless adequate facilities are provided for shipping the surplus products to other parts of the country. The extensive refrigeration industry which makes it possible for the East to enjoy the fruit and dairy products of California is here described by the general inspector of the San Joaquin Light & Power Corporation, who was also author of the article "Making Ice Cream Electrically," which appeared unsigned in the August 15th issue of the Journal of Electricity.—The Editor.)

The prosperity of the community depends as much on its ability to ship out its product successfully as on its ability to produce it successfully, and ice for shipping melons, fresh fruits, grapes and berries is equally as necessary as the irrigating stream because it at once widens the field in which the product can be distributed.

In a great agricultural territory such as the San Joaquin Valley, electricity and the equipment provided for its utilization are required, not alone for the irrigation of the vineyard and orchard, and in the packing house, but also to make successful shipment possible.

400-hp. motor driving duplex ammonia compressor at Fresno Valley Ice Plant. This was the second of four units installed. To the left is a motor-driven air compressor.



An old picture of a freezing room, showing the tilting machine in the center background and a hand-operated can crane. Note the brine agitator belted to the motor.

Refrigeration Cars for Fruit Products

The largest single industrial consumer on the system of the San Joaquin Light & Power Corporation is the Valley Ice Company, of which Mr. J. R. Erskine is general manager, and which operates its largest plant at Fresno, one at Bakersfield and another at Modesto. The bulk of the product is used in refrigerating fruit cars.

The plants are located on the railroad main lines, the one at Fresno lying between the Southern Pacific and Santa Fe tracks, where they closely parallel each other. Sidings from each have been constructed along the loading rack from which the cakes of ice are pushed into the hoppers of the refrigerating cars. Whole trains of these cars are run in on each side of the rack.

The trains of empty cars are shoved in on both side of the rack at once, iced for precooling, and then taken to the loading stations where shippers have ordered cars. After being loaded with fruit, melons, etc., they are returned and re-iced for their journey overland, during which they are re-iced as required, at El Paso and other points.

The list of shipments over long distances from the San Joaquin Valley includes oranges, grapefruit, lemons, fancy table grapes, plums, peaches, apricots, pears, persimmons, pomegranates, nectarines, figs, water melons, turkish melons, cantaloupes, etc., some shippers having their entire crop contracted for by single concerns in the extreme East, while a great many of the melon shipments go north into Oregon and Washington.

Other products shipped under ice from the Valley in large quantities are eggs, butter and fresh meats, requiring, in addition, cold storage previous to shipment.

Electric Drive

The Fresno plant of the Valley Ice Company, the largest plant of its kind in the West, is served from the main 60,000-volt lines of the San Joaquin Light & Power Corporation through a separate substation, on the premises, equipped with a bank of 3—667-kva. Westinghouse transformers connected 60,000-volt star, 440-volt delta, with a spare for emergency use and to permit inspection, etc., without interruption.

The plant operates the following equipment:

Two 400-hp. Allis-Chalmers 400-volt, three-phase, 60-cycle, 390 r.p.m. wound rotor motors; one 500 hp. Westinghouse squirrel cage motor, and one 100-hp. wound rotor motor, both 390 r.p.m., used for driving four ammonia compressors.

Local industries mean local homes and local home appliances.
FORWARD WESTERN INDUSTRY!

The smaller units include a 30-hp. motor driving the conveyor on the car-loading rack or platform; four 15-hp. motors on the ice drags or elevators to the platform; a 3-hp. motor on the hoist in the storage house; five 7½-hp. motors driving ice tank (brine) agitators; two 10-hp. motors on the air compressors furnishing air for can pullers, etc.; four 20-hp. motors on pumps for the water supply; a 20-hp. motor on the positive blower for air for "clear ice" air jet agitators; and two 5-hp. motors, one for the shop and one for a car gypsy or winch for moving cars on the siding in the absence of switch engines when loading ice for shipment at the door of the storage warehouse—1660.5 hp. in motors in all.

Refrigeration Process

There are 5326 ice-making cans in which are frozen 300-lb. cakes requiring 32 hours freezing, the regular "can system" being used. These cans are filled in place in the freezing tank, through automatic can fillers which shut off the water when the cans are filled to the proper height. The water is pumped from private wells on the premises.

The sides and bottoms of the cans, during freezing, are surrounded in the tanks by brine which is kept circulated between the cans and the ammonia-expansion coils, also submerged in the tanks, so as to extract the heat from the water in the cans, allowing it to freeze, while the heat is transmitted by the brine to the ammonia coils where, in expanding (evaporating) from ammonia liquid under pressure to ammonia gas at reduced pressure, the heat is absorbed.

The temperature of the brine in the tank is maintained at from 8 to 12° F.

The tops of the cans are each covered by heavy blocks which, when all are in place, form a complete cover over the whole tank during freezing.

Part of the plant is equipped with "clear-ice" making equipment which consists of air agitators placed in each can to agitate the water while freezing, thereby producing clear, crystal ice, which is easily obtained, the water here being exceptionally pure.

The largest portion of the ice made is called "white" ice, used for refrigerating railroad cars, and is made from the same water as is used for making clear ice, but the product is "white" on account of the air being frozen in, instead of being liberated by the air jet agitators.

The pipes are then withdrawn at the proper time and when freezing is nearly complete all impurities are left in the small remaining amount of unfrozen water. This is removed and the crevice filled with fresh water which is allowed to freeze in.

The cans are then lifted out, four at a time, by traveling, compressed-air, direct-acting hoists or rams, two of these (each lifting two cans) being mounted on cross travelers of a bridge or crane which travels the length of the tank.

When the cans are raised to the proper position, the air is automatically shut off and the crane is moved to the end of the tank. The cans are lowered into warm water to melt enough next to the surface to loosen the cakes and are then raised, moved over, and lowered into tilting machines. Each of these takes two cans and turns them nearly upside down, so that the cakes slide out into inclined troughs and pass through trap doors into the storage room. In this room, which is kept at a temperature of 26° F., the ice is stored until wanted.

Loading Cars

From this storage, delivery is made to trucks for city wholesale delivery, to cars for shipment, and to an elevator which carries the cakes to the long loading rack where they are picked up by a conveyor and carried along the rack, where men are stationed with hooks and picks. Those with hooks jerk the cakes off the conveyor as required, causing them to slide off to the scuttles or hatches on top of the refrigerator cars; the men with the picks jab the cakes as they go down so as to break them, exposing more surface to the air in the car for refrigeration.

Twenty cars can be run in on each side of this rack and loaded in 3.5 hours and, as each siding is open, loading can be accomplished continuously.

Nine thousand cars will be loaded in this way from the Fresno plant this year, requiring 100,000 tons of ice and providing for the refrigerated shipment of 315,000 tons of fruit, etc.

The standard car holds about thirty-five tons of fruit and requires nine to twelve tons of ice in precooling and re-icing.

Demand and Output

Part of this ice is made in winter and accumulated during slack days in summer, and in the past part has been natural ice shipped in from the high Sierras at Truckee, and elsewhere when necessary, although this source is becoming less of a factor on account of demands closer to those fields, and on account of freight conditions and cost. Consequently the ice plants had to be enlarged.

During the past year 110,000 tons of ice were made at the Fresno plant, the peak demand being 1102.12 kw. on the substation and requiring a total of 4,573,633 kw-hr. of electric energy.

The plant now has a capacity of 525 tons of ice per day, and runs twenty-four hours. When a compressor is started in the spring it is generally run continuously till late in the fall. Part of the plant is operated all year.

Thirty-five thousand pounds of liquid ammonia (anhydrous ammonia) is required to fill the ammonia system. It is compressed to 185 pounds per square inch, in a gaseous state, then cooled in coils under a water shower on the room, where it liquifies. After this it is conducted to the "expansion coils" in the freezing tanks and storage rooms, expanding (evaporating) into a gas at about eighteen to twenty pounds per square inch pressure, when it has a volume of about twenty-one times that of the equivalent liquid.

The output last year, the present daily capacity in tons of ice, and the installed horsepower in motors of the larger plants in the valley are:

Name	Location	Output	Capacity	Motor Hp.
Valley Ice Co.,	Fresno	100,000	525	1660
" " "	Bakersfield	70,000	325	1075
" " "	Modesto	70,000	410	1045
People's " "	Fresno	15,000	260*	775*

*NOTE—Increased this year from 60 tons per day capacity to 260 tons per day.

The peak demand in a 500 tons-per-twenty-four-hours plant is about 1100 kw. and in a 60-ton plant about 190 kw., and from 40 to 60 kw-hr. are required in the process of manufacture of a ton of ice in these plants. The load factor is exceptionally high.

The Valley Ice Plants ice the greater part of the refrigerator car shipments and do no retail business, wholesaling to delivery companies in addition to car icing. Other plants furnish ice, principally for cold storage and domestic use, by wholesale and retail delivery.

This industry, which is very important and little heard of, has been making rapid growth: ice consumption in the home, restaurants, hotels, stores and ranch houses has made great strides in recent years, when even drug stores, hospitals and doctors have installed special refrigerators for keeping serums, photographic plates, etc., during hot weather. In addition, the average butcher shop, creamery, large office building and warehouse, are equipped now with refrigerating plants for show windows, storage rooms, drinking water, and so forth.

Ice refrigeration is accomplished by salting down ice in a refrigerating space, the salt causing the ice to melt at a few degrees lower temperature and, heat being absorbed in melting the ice, the space is thus cooled to as low as about 26° in some cases; salt is used only where rapid refrigeration or low temperatures are required.

The central stations may do well to encourage the twenty-four-hour loads in plants where ice refrigeration is not economical and where sufficiently low temperature cannot be attained by ice refrigeration.

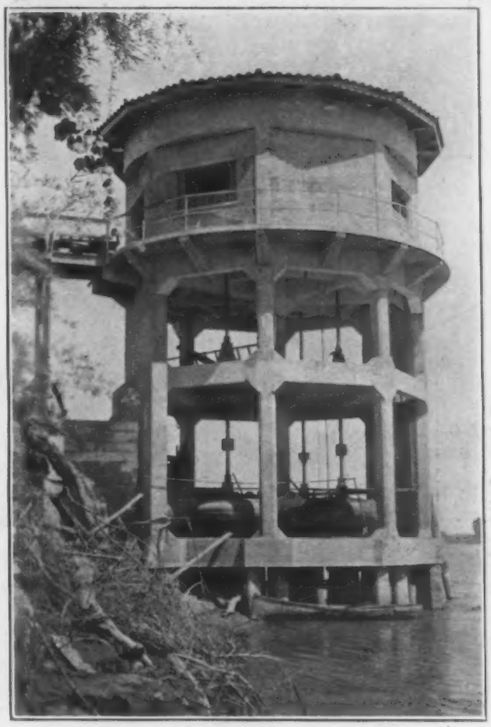
A NEW PUMPING INSTALLATION

The Conaway river plant which has recently been completed on the Sacramento River is located at Elkhorn in Yolo county, about seven miles due east of Woodland. The plant was erected under the direction of Mr. Fred Tibbetts, civil engineer, who also supervised the construction of the irrigation and drainage ditch system, as well as a couple of other pumping plants that are located at different points on the Conaway land.

The Conaway river plant is a little different from the usual type, as on this installation vertical pumps and vertical motors were used. The building which was erected to house the pumps and motors is octagon shaped, and was erected on concrete piles which were driven into the bed of the river. The pumps are mounted down close to the level of the water so that the discharge pipes from them run directly into a tunnel at the base of the levees to a canal on the inside of the district where the water is conveyed by gravity. In the upper part of the pump house building the vertical motors and the switch boards are installed. The accompanying photograph shows a view of the pump house which was taken when the Sacramento River was rather low.

During the greater part of the year the pumps which can be seen in the lower part of the inclosed picture, would be submerged. The shafts which extend from the pump to the motors are distinctly visible. The electrical equipment consists of four 300-hp. General Electric vertical type motors. These are supplied with 440-volt alternating, three-phase, sixty-cycle current. The switch board which controls the motors is located in the center of the pump house.

The pumps, which were made by the Price Manufacturing Company of San Francisco, are each rated



Conaway river pumping plant at Elkhorn

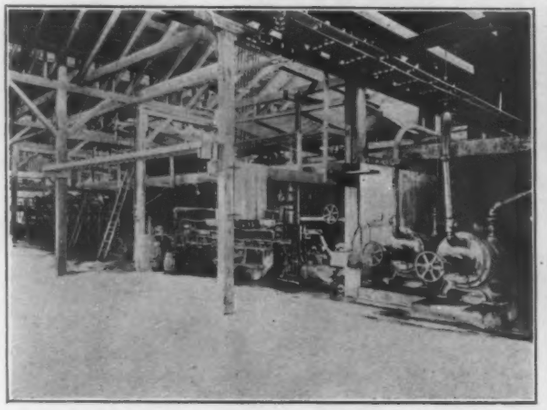
at 36,000 gallons per minute, and are designed to operate against a head of fourteen feet. The water is carried from this pumping plant across the Yolo basin into a reservoir from which it is diverted by gravity to the various lands on the Conaway Ranch. The service is fed from the Woodland substation of the Pacific Gas & Electric Company at 11,000 volts. The transformers reduce the voltage from that to 440, and it is carried from them to the switch house in which the meters are installed and from that point in conduit to the switch board that is in the main pumping plant.

This installation has been watched with interest by engineers engaged in irrigation work and after tests have been conducted it may prove to be the solution of certain problems that are met with in rivers with high banks or levees.

The Atlantic is bordered by countries inhabited by 325,000,000 people, the countries bordering the Pacific contain 630,000,000. The Pacific Coast is the gateway to this region.

FORWARD WESTERN INDUSTRY!

Building the Industrial West



PAPER MAKING

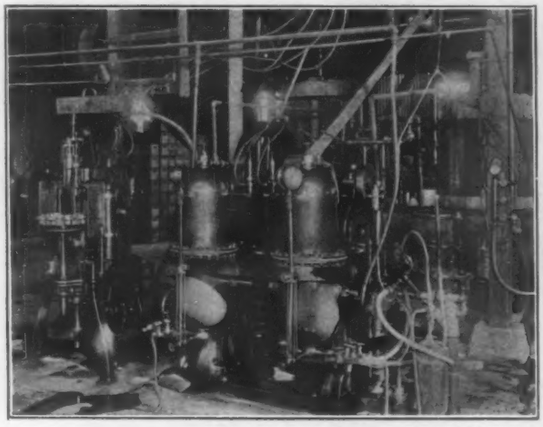
Pulp machines in the California Tissue Mills at Vernon, California, where electric drive makes the factory an important consumer of power.

SHIPBUILDING

Electrically equipped machine shop of the Craig Shipbuilding Company, Long Beach, California. Electricity is being widely used in Western shipyards.

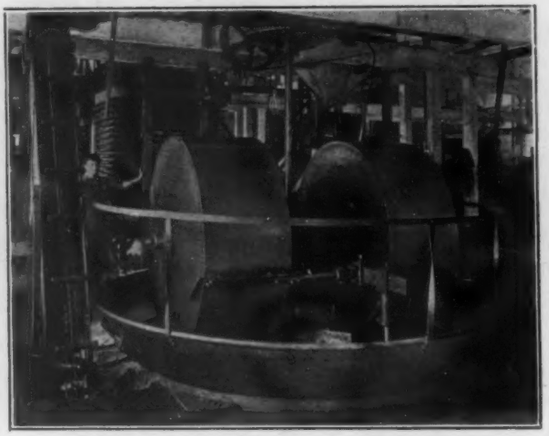
RUBBER GOODS

One of the largest users of electric power in the West is the new factory of the Goodyear Rubber Company, near Los Angeles, California, recently constructed at a cost of $20,000,000.



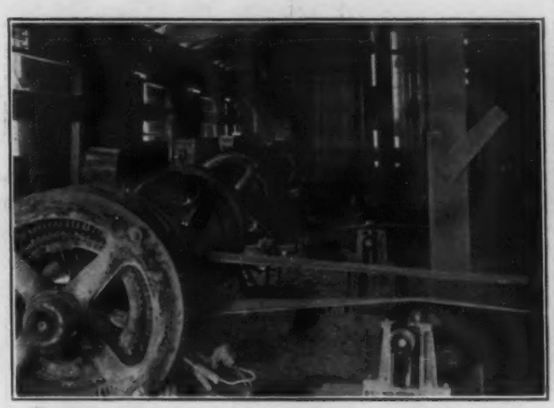
CARBONIZING

Electrically driven carbonizer used in the manufacture of soft drinks at Fresno, California. One of the results of prohibition, as this was formerly used for other purposes.



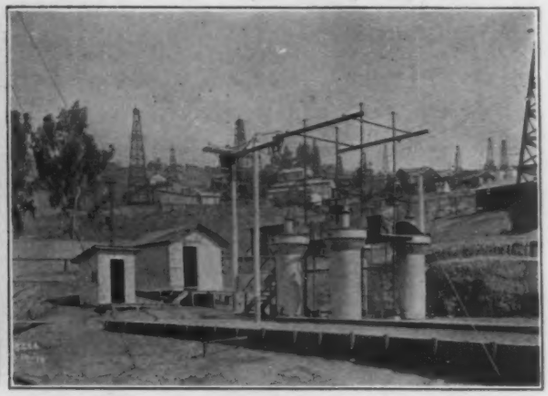
VEGETABLE OILS

Electrically driven machinery is being used by the Los Angeles Olive Growers' Association for the extraction of the olive oil from the fruit grown on their 1800 acres of olives.



CEMENT

A battery of motors in the plant of the California Portland Cement Company at Colton, California. Construction work in the West makes a large demand for Portland cement.

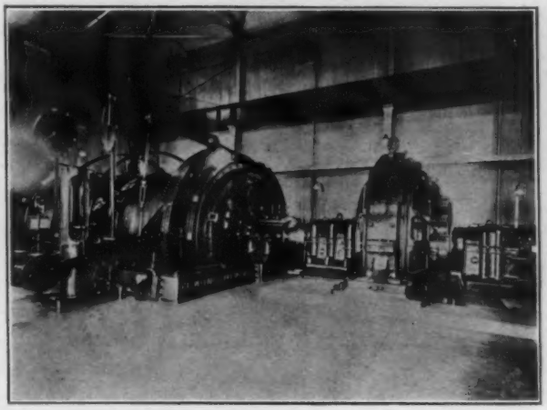


OIL FIELDS

Not only in the production of oil is electricity used extensively, but also in its dehydration. This picture shows the dehydrating plant at La Brea, California.

MILLING

Twenty thousand horsepower in motors are installed in this Magna Mill of the Utah Copper Company at Garfield, Utah. A great deal of electricity is used in the metal-mining activities of this region.

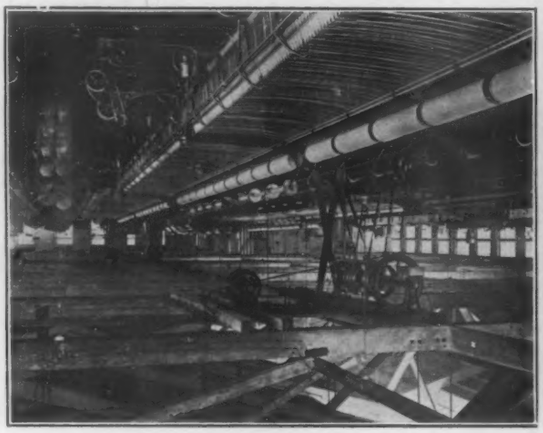


MINING

Large installation at the mine of the North Butte Mining Company, Butte, Montana. This 1850-hp. direct-connected motor is used in the hoist house.

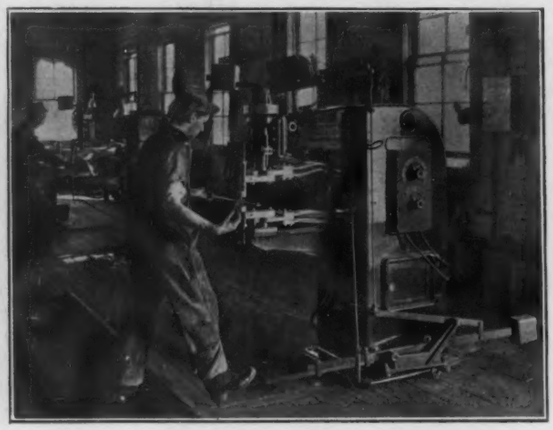
LUMBER

Direct-connected 250-hp. motor driving a 72-in. by 12-in. edger at the Snoqualmie Falls Lumber Company's plant, Snoqualmie Falls, Washington.



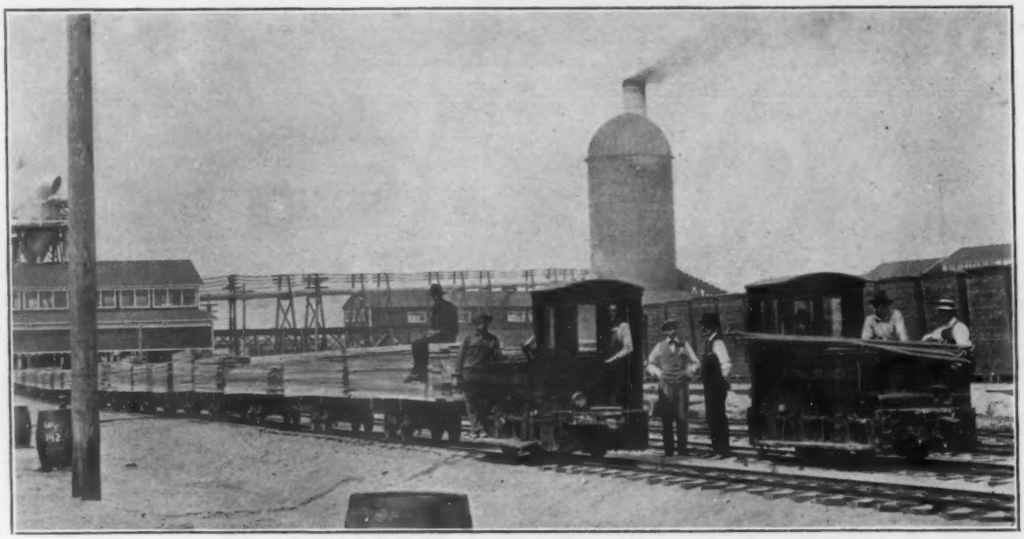
SPINNING

Motor-driven spinning machines at the Portland Woollen Mills, Portland, Ore. Portland is now the second largest wool center in the United States.



WELDING

Spot welders in operation at the Columbia Wire and Iron Works, Portland, Oregon. There are a number of other similar installations in this city.

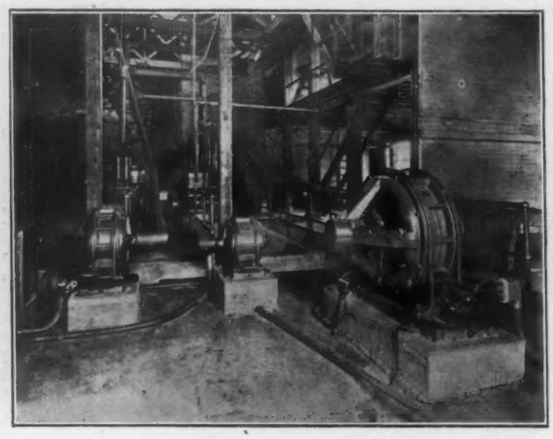


TRACTION

A 7-ton locomotive in the yards of the Weyerhauser Timber Company at Everett, Washington. Storage battery locomotives are being used in all kinds of industrial plants.

FURNACES

A two-thousand-pound electric brass furnace at the foundry of the Oregon Brass Works, Portland, Oregon. A manufacturer of electric steel in Portland is installing a new furnace of 1500-kw. capacity.



REFRIGERATION

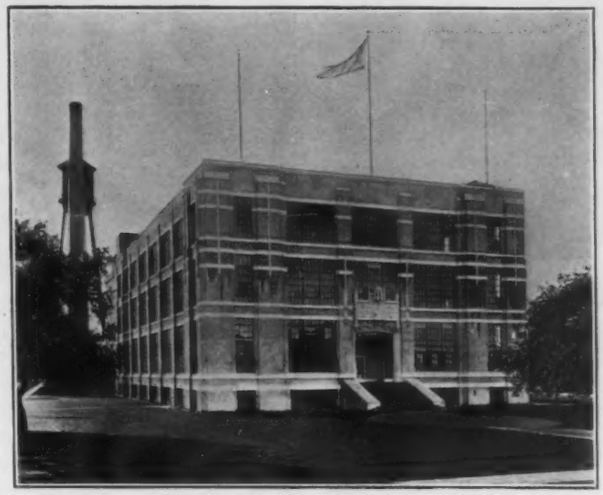
Motors driving ammonia compressors, Crystal Ice & Cold Storage Company, Portland, Oregon. All refrigeration and ice-making in Portland is done electrically.

An Electrically Manufactured Food Product

(The industrial load in the West is becoming an important factor in the electrical development of the region, and consequently of its general prosperity. Following is a description of a model factory using electric drive in the manufacture of a food product and showing the possibilities for progressive industrials in localities where cheap electric power is available.—The Editor.)

Turning 400 bushels of wheat a day into a breakfast cereal would have been a herculean task for a regular army of factory workers in the age of miracles, but in the non-miraculous twentieth century a few dozen unhurried employes stand and watch electricity do it for them.

The green lawns and smokeless air around the Shredded Wheat factory at Oakland, California, are in keeping with the shining and smoothly-operating interior, and belie the common conception of an industrial plant as necessarily a manufacturer of soot and noise. Inside, the simple-looking processes through which the wheat passes in its transformation into the popular shredded wheat biscuit, are a series of illustrations of the debt which modern industry owes to electricity. From the moment the railroad cars deliver the wheat at the receiving platform of the factory—on a spur track from the electric system of the Oakland, Antioch & Eastern Railroad—until the biscuits are ready for shipment, the electric motor is in constant evidence.



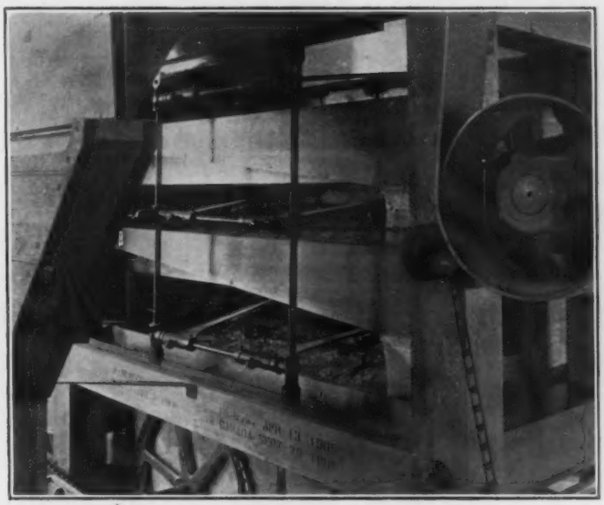
The electrically equipped Shredded Wheat factory, Oakland, California.

Power is supplied by the Pacific Gas & Electric Company at 4400 volts and stepped down by the factory's transformers to 110 volts. All the motors are Westinghouse make. In addition to its electrical equipment the factory has a special adjoining boiler house, where two B & W boilers generate steam for cooking and heating.

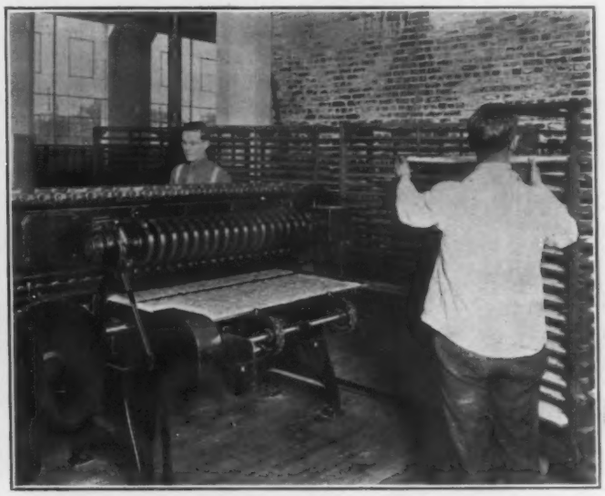
The sacks of wheat are not carried into the factory, but emptied direct from the car into a hopper, and conveyed from there by an electrically-driven screw conveyor to the weighing room. From the automatical scale the wheat is electrically elevated to to the header room in the top story of the building, and delivered to another long screw conveyor which drops it into huge storage tanks. Two 10-hp. motors operate this second conveyor system.

Cleaning and Cooking

A motor-operated belt-and-bucket type of conveyor feeds the wheat from the storage tanks into the cleaning machines where it passes through five different processes. The various machines, driven by a 40-hp. motor, shake and sift it, separating all waste material such as dust, chaff, seeds and stones.

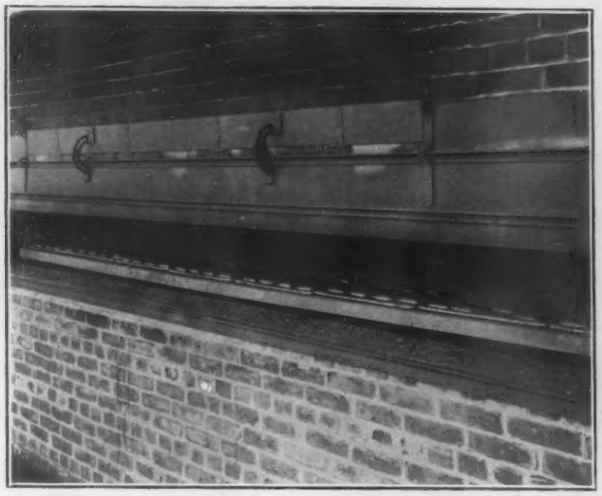


One of the motor-driven separating machines where the wheat is shaken free of dust and other foreign matter before being cooked.

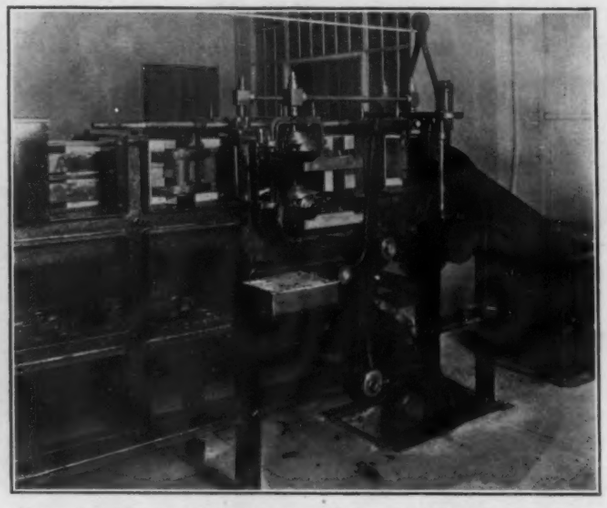


The electrical cutting machine where the shredded wheat is cut into biscuits and dropped on trays in rows ready for the oven.

Industrial growth means not only an increased industrial load for the power company but also an increased home demand.
FORWARD WESTERN INDUSTRY!



The giant oven in which Shredded Wheat biscuits are baked. The interior revolves in the manner of a Ferris wheel. The temperature of the oven is 500° F.

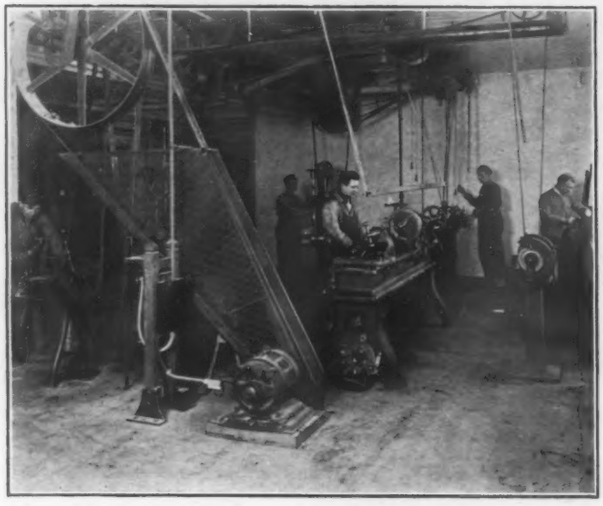


Automatic sealing machine where the packed cartons of biscuits are sealed top and bottom. Notice the elevator at the right by which the cartons come up from the floor below.

After being cleaned, the wheat is carried by bucket conveyor to another automatic scale where it is re-weighed and passed on to the cooker. Here it is steam cooked for 30 minutes, an electrically driven paddle inside the cooker keeping the grain constantly in motion. This process thoroughly cooks the starch grains and causes the wheat to swell up and become soft. The grain emerges from the cooker, however, perfectly whole, and passes by an electrically-driven ventilated conveyor (which allows it to dry thoroughly on the way) to large tanks where it is stored over night.

Shredding and Cooking

Another conveyor system delivers the cooked wheat to the shredder where it goes through a process which is the most interesting of all to watch. The grain, now in a soft state, is passed along on a belt from which it drops at intervals down small hoppers or funnels. Below each hopper is a pair of steel rollers, one smooth and one corrugated, and the soft wheat passing between them falls into a moving trough below in the form of long shreds. As the trough moves along under the series of hoppers the light layers of shreds accumulate, and by the time the end of the line is reached the accumulation is of the required thickness for the biscuits.



Electrically equipped machine shop of the Shredded Wheat factory where all repair work, and so forth, is done.

The cutter at this end consists of series of small knives on a revolving belt, each one of which cuts a biscuit from the end of the moving line of shredded wheat. Air suction holds up the cut biscuits until fifteen have been cut, when the whole row is deposited simultaneously on a tray. The cutter goes on without interruption, and the tray moves out slightly to make room for the next row of fifteen. As the knives on the cutter pass along the top of the belt they are brushed by a stiff revolving brush and are free of shreds when they pass under for the next cut. This shredding and cutting machine is driven by a 50-hp. motor.

Baking

When one tray is full of biscuits it is removed by the attendant and loaded on to a kind of dumb waiter—tiers of racks on wheels. When this is full it is wheeled away to the ovens where the trays of biscuits are transferred for baking. Inside these gigantic ovens is a great wheel, similar to a Ferris wheel, which revolves, bearing the trays of biscuits through a temperature of 500° F. After 25 minutes the biscuits are baked to a crisp brown and the trays are drawn out and again placed on the trolley. This is then wheeled into a hot air chamber,—where a temperature of 210° F. thoroughly dries the biscuits without cooking them any more—out at the other end, and over to the packing tables.

Packing and Sealing

At the packing tables the trays of biscuits are loaded one at a time on to a wide slowly-moving belt. The girls seated at the tables take the biscuits as they pass and pack them in the familiar cartons, placing the full cartons on another moving belt above the trays. These pass along to a small elevator shaft through which they are raised automatically

to the sealing and packing room on the floor above. Here they pass through the electrically-operated sealing machine which pastes the flaps of the cartons, closes them and seals them with strips of gummed paper.

At the other end of the sealing machine the cartons are received by an attendant who packs them in large cases ready for shipment, 36 cartons to a case. The cases are then loaded on to a spiral elevator which delivers them outside the building on the same platform where the original wheat was unloaded from the railroad car. The output of the factory is about 1100 of these cases per day.

The most vivid impression left in the mind after watching the entire process is the miraculous ease with which the whole complex system operates, the electrically-driven machinery passing the product unerringly through one process after another with hardly any human labor other than supervision. The perfect cleanliness of the method electrical is also brought home very strongly as the ideal method for the manufacture of a food product. The Shredded Wheat factory with its modern equipment has become one of the show places of Oakland—so much so that a special guide is maintained to show visitors through the building, and the car conductor calls "Shredded Wheat" at the car stop. The factory, which is comparatively new, is an example of the type of industrial development which is taking advantage of the availability of cheap power on the Pacific Coast, and building up the industrial load which is to mean more and more to the prosperity of the region west of the Rockies.

The rest room for women employes at the Shredded Wheat factory. In addition to this there are recreation grounds, locker rooms, shower baths, a hospital, and a dining room where employes are the guests of the company for lunch.

Large Capacity Navy Yard Crane

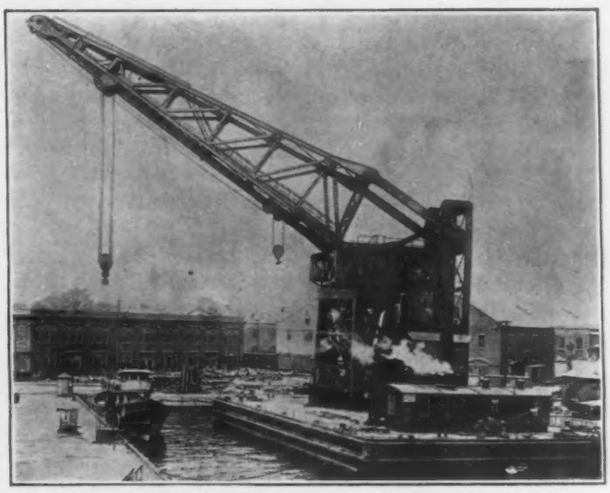
(Increased production is largely dependent upon the rapid and efficient handling of material, and the electrically operated crane described below has contributed in no small degree to the work of the large Western navy yard where it is installed.—The Editor.)

A 150-ton electrically operated pontoon crane, put in service last year in the Navy Yard at Mare Island, California, has several interesting features. The crane lifted and swung a 205-ton load of armor plate in the acceptance test. A complete power plant is contained in the hold, so that the crane can operate independent of shore connections, but it has no propelling machinery and a tug is required for moving it except as it can pull itself along the water front by means of shore or anchor lines to the motor-driven capstans. Its total floating weight is about 2600 tons.

During the year in which it has been in service at Mare Island it has been busy practically all the time, sometimes sixteen hours out of twenty-four. It first gained popularity with yard officials because it could handle the smaller boats that otherwise would have required the use of the drydocks, but the placing of boilers, guns, armor plates and other heavy equipment has been done so much more easily with this crane than was formerly possible, that it is now said to be one of the handiest pieces of equipment at the yard.

The steel pontoon which forms the support for the superstructure is 85 by 140 ft. in plan and 15 ft. deep. Full depth collision compartments entirely surround it and there are also longitudinal and transverse bulkheads in the interior. Compartments for the boiler plant and generating unit are in the after-end, and have an open hatchway covered by a deck house. One end of this deck house is enclosed and used as the crane office.

The superstructure is located on the longitudinal center line of the pontoon with its center 42 ft. from the forward end. A fixed tower 43 ft. high, which is secured to six bulkhead plates extending through the deck of the pontoon, surrounds the lower part of the rotating structure, called the pintle. The entire



The 150-ton electric crane at the Mare Island Navy Yard, California, has facilitated tremendously the handling of the construction and repair work

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$710,510,000 is to be spent in the development of the power resources west of the Rocky Mountains within the next nine years. The power companies will be ready for the industrial load.

FORWARD WESTERN INDUSTRY!

rotating element of the crane consists of three parts, the pintle section, the machinery section and the jib. All motions of the crane are controlled from the operator's cab which is located on the rotating structure.

The main hoist, designed for a capacity of 150 tons at a radius of 105 ft. (which gives a reach of 62½ ft. beyond the fender line), consists of two separate units, arranged to be connected when handling capacity load. Their hook blocks are suspended from a fixed position on the jib and operate at a rate of 4 ft. per minute from any position between 25 ft. below to 95 ft. above water level.

A hook block for handling loads under 25 tons is suspended on a trolley which travels along the under side of the jib. This hoist has a vertical range from 25 ft. below to 130 ft. above water level. It can handle a capacity load at a speed of 12 ft. per minute or a 5-ton load at 60 ft. per minute. The jib, carrying the maximum load, is luffed from its lowest position to the highest point in 15 minutes, and in the reverse direction in about 11 minutes. A complete rotation of 360 degrees under full load conditions requires between 4 and 5 minutes.

Each of the 75 ton main hoist blocks is operated by a winding drum connected by three cut spur gear reductions to a 40-hp. series wound motor. An electrically operated disk brake is attached to the motor pinion shaft, and so connected that it sets instantly when the current is cut off the motor. In addition to this, there is also a mechanically operated band brake for emergency use only, this brake being attached to the intermediate shaft. A master switch in the operator's cab operates the magnetic switch controller which regulates the hoisting mechanism. The magnetic controller is provided with a dynamic braking device to give positive and accurate control when lowering heavy loads.

The 25-ton auxiliary hoist block is operated by a hoisting unit located in the machinery section of the rotating structure directly above the main hoist units. The motors are of the same capacity, and control and automatic braking devices are similar to those of the main hoist. This block is suspended from a movable trolley which travels along the under side of the jib. The mechanism for this motion includes 40-hp. motors and control equipment similar, in the main, to the other two units.

Electric current for operating the motors and lights is supplied by a cross compound marine engine direct-connected to a 150-kw., 250-volt d.c. generator. The power leads from the main switchboard terminate in contact shoes attached to the fixed tower and engaging collector rings on the rotating structure. Steam for the engine generator set and for two steam-driven windlasses is supplied at 150-lb. pressure by a 200-hp. Scotch marine boiler.

Four capstans driven by 15-hp. motors are located at the corners of the pontoon. Internal gearing on these capstans is so arranged that the change from high to low speed is effected by simply reversing the motor.

AN OIL-ELECTRIC PROPELLED YACHT

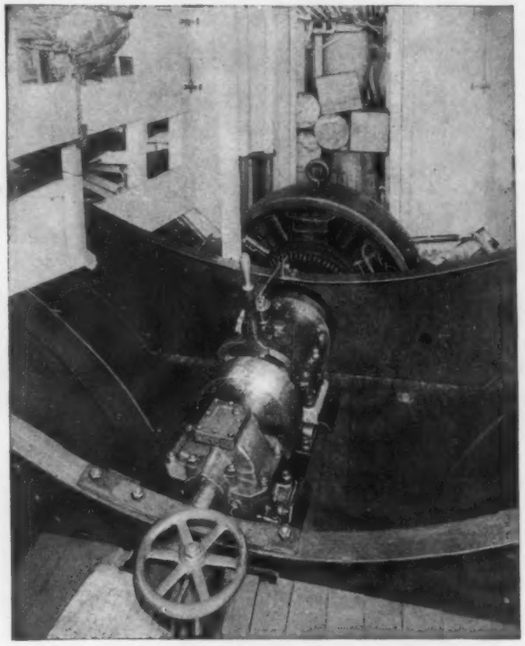
The yacht Elfay—the first in the world to be driven by the Diesel electric system of propulsion—left New London in the early part of this year for southern ports.

This most interesting little vessel, which was originally the "Katoura," was built in 1914. She is essentially a sailing schooner, 152 ft. over all, 30-ft. beam and 313 tons. Her propelling equipment consists of a 60-cylinder 115-hp. model 54 Winton Diesel oil engine direct-connected to a 75-kw. Westinghouse generator. This supplies power to a 90-hp. Westinghouse motor of 360 r.p.m., which is directly connected to the propeller.

The control of this motor is centered in a single handle located on the deck. By turning this handle in one direction, the propeller motor is started from rest and brought through several steps up to full speed ahead. By turning the control handle in the reverse direction, the motor is reversed in a similar manner, and the change from full speed ahead to full speed astern can be effected in 5 seconds. There are no signals to the engine room, and the officer in charge has full control of the propelling equipment. A set of meters gives the navigator full information as to the performance of the machinery.

This simplicity of control is due to the fact that the controller handles neither the main engine nor the main motor current, but only the small generator-field current. The engine itself is operated from the engine room, but is merely kept going at normal speed in one direction only.

All of the auxiliary equipment of the Elfay is electrically operated, including the winches, pumps, fans, blowers, ice machines, and so forth. She is also electrically heated.



The engine room of the Elfay, the first yacht to be driven by the Diesel electric system of propulsion. The motor shown is centered in a single handle located on the deck.

This old San Joaquin Plant No. 1 was placed in operation in 1896 and was the subject of much comment not only on the boldness of the long transmission line but on the daring of the development itself, due to the great head under which the wheels operated.

The penstock control system consisting of gates, air vent and air pressure box at the head of the pipe line above old "San Joaquin" Power House No. 1 has been abandoned since 1911 when the new No. 1 plant was installed.

Reminiscences of Power Development on the San Joaquin

BY A. G. WISHON

(The early adventures of a power company in the pioneer days of Western hydroelectric development provide a story of intense human interest as well as a historical record of no little significance. The romantic history of a company which now serves almost the entire San Joaquin Valley is told here by its general manager. The second part of this story will appear in the next issue.—The Editor.)

In 1895 Eastwood and Seymour built the first power house of this system on the San Joaquin River, with a capacity of 1450 kw. and a transmission line thirty-five miles long into Fresno, which at that time was the longest transmission line in existence. The static head of the plant was 1410 ft.—the highest operating head then in America. The line had two circuits carrying 11,000 volts on one pole line of sawed, square redwood, 35-ft. lengths and spaced 125 ft.

A Dramatic Beginning

All troubles incidental to new things happened to these pioneers. One of the interesting incidents that occurred was in the installation of the machinery in the power house, by a German electrician sent by the General Electric Company. At that time it was thought that a quick closing valve was necessary, presumably that the plant might be shut down quickly in event of a dead short, as only hand governing apparatus was then provided. He forgot to screw on the nozzle tip, and when he opened the gates it flooded the wheel housing and power house floor. He then touched off the automatic valve, rupturing the pipe about 500 feet above the power house. This permitted a quick escape of the water and sucked shut about 2,000 feet of the upper end of the riveted pipe line, so that it was many moons before the power house was ready to operate. In the hurry to install more pipe, this repair job was laid with lead joints. The organization was familiar with the laying of pipe lines with lead joints and knew little of the more modern method of riveting. In the confusion that followed, this German workman left the plant about an hour before nightfall—even leaving his hat—and walked some sixty miles to Madera, where he took the train for San Francisco, drew out of the bank his balance of about $2,000 that he had placed there on his arrival from Germany, and the next time the General Electric Company heard from him he was back in Germany, where he probably thought he would be safe from being sued for damages. He was taking no chances on losing his money.

In the Camp of the Enemy

These people who built the first San Joaquin plant owned and operated the Fresno City Water Works, and, of course, because of their coming into the town with a new lighting scheme were at once considered the arch-enemies of the people owning the Fresno Gas Works, that up to that time had furnished gas for lighting Fresno; and as it was before the days of cooking with gas it looked as though they were going to lose the major part of their business. The late Fulton G. Berry was the moving spirit in the gas works and was also proprietor of the Grand Central Hotel, and as such, was looked upon by the whole community as a plutocrat and corporation magnate. In order to head off the power company, which they considered their deadly enemy, that was taking away all the lighting business of this coal gas works, the fertile brain of our late friend Berry conceived the idea of buying riparian land on the South Fork Canyon above the intake of the power company and diverting all the water and using it to irrigate the chaparral on top of the flat ridge, and, with the aid of two men he kept it from flowing back to the stream. This was done at the low season of the stream flow, when it took all the water in the stream, and while it fulfilled no useful purpose, it did accomplish its deadly work

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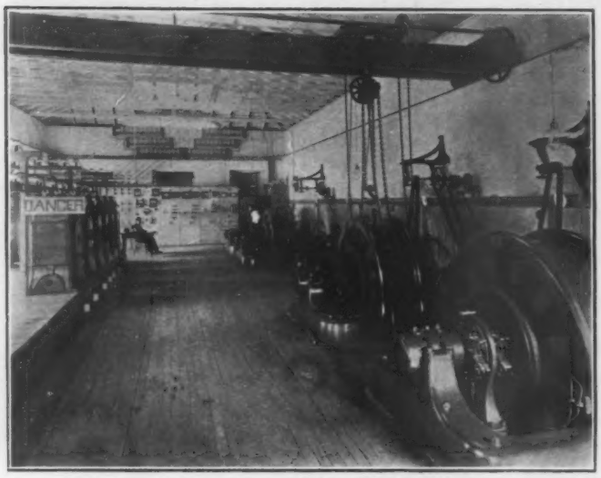
21% of the nation's copper is located west of the Rocky Mountains. This is but a sample of the raw mineral wealth at hand.

FORWARD WESTERN INDUSTRY!

and was the real cause of the new power plant going into the hands of a receiver. Here is where the present owners found it, and here the story of San Joaquin's progress begins.

The receiver, however, during his term as such, issued certificates and financed the building of a small reservoir that held 2,650 acre-feet, the earthen



No. 1 Power House of the old San Joaquin was equipped with four G. E. 3-phase, 700-volt, 360-kw. revolving type generators of the 1896 model. This plant was regarded as the most efficient of its time. The water wheels were outside the building, the drive shaft running through the wall housing the generators. The water wheels were equipped with Dobel buckets.

restraining dam for which was built adjacent to the present dam of the Crane Valley reservoir. The reservoir so created is a part of what is now the 50,000 acre-foot reservoir of the power company.

Getting Things Started

When the new management arrived on the job, early in 1903, the pine lumber flumes in the conduit line, which constituted about one-seventh of the whole distance, were so rotten that the lumber would hardly hold a nail. There were no lumber mills running in that section at that time, so the repair of the flumes was made with wire yokes. The pipe line was not covered for three-quarters of its length and, therefore, the expansion and contraction necessitated shutting down once or twice every week for a number of hours, in order to tighten up the lead joints that would crystallize on account of vibration; but with the aid of a wheelbarrow crew, this pipe line was soon covered, the lead joints being left exposed so that they might be tightened up from time to time. The covering of the pipe line, with the exception of the joints, did away with nine-tenths of the shutdowns. Bulkheads were then erected in the spillway at the dam, increasing the stored water in the reservoir to 4300 acre-feet.

As the load came on gradually, the voltage was stepped up to 19,200, with the possibility of a future step to 33,000, though at that time so radical a departure was looked upon with considerable suspicion, notwithstanding that we incurred an expense of re-insulating the line with pin type insulators, sufficient for that purpose.

The Battle of the Meters

A line had been extended to Hanford and service was rendered for lighting, nearly exclusively on a flat rate, with the help of about one thousand Lacy controllers, the scheme of which was to kick out if they put on more lights than they contracted for. At that time, probably not more than 100 meters were operating in Fresno and none in Hanford. The process of changing from flat rates to meters necessitated the manager moving his desk up near the front counter, so as to lend assistance to the victim on the front counter, whose duty was to put over enough diplomatic talk to convince the consumer that it would not "hurt much," if at all, to make the change; but we were cautious enough to pick out what we considered the least influential people first, in bunches of one hundred to a hundred and fifty, and get them connected up before we would select with great care and consideration another lot. Many were the long-winded discussions, but we finally got it down to the last hundred lot, which was supposed to be the most influential hundred in Fresno, and great care and diplomacy was exercised in convincing these people. The final argument used was that flat rates had put the old company in the hands of a receiver, and all in the world that we were trying to do was simply to keep out of the same predicament.

To save the cost in re-insulation of the line from the power house to Fresno, we conceived the idea of cutting out every other pole. Before deciding upon so radical a departure from the standard practices of transmission line construction, we called in one of the leading electrical engineers of the Coast, who concluded that a 250-ft. span was unthinkable and unsafe. He would consent to 200-ft. spans but not a foot longer, and therefore this radical departure was abandoned. From one standpoint, it was cheaper to buy and erect the additional number of insulators than it would be to dig holes and reset the poles, and the controlling question was—we had but one pole line and could not think of abandoning it long enough to rebuild.

The line to Hanford had been built to the same type, with 150-ft. spans, and Hanford was on a flat rate, paying $400 a month. When our old friend, the late H. G. Lacy, was notified that we expected to install a meter it caused him great apprehension and almost resulted in a riot, and, when the meter finally got into action and his first bill was rendered for $1100.00, the management would be at Crane Valley when Mr. Lacy came to Fresno and would not return until Mr. Lacy got back to Hanford. But finally he got used to it, and soon it became a matter of course. Our relations were ever after very pleasant.

The "Old French Ditch"

In about 1875 the Quartz Mountain Mining Company built a ditch from the present site of Crane Valley Dam, on the location now occupied by the No. 3 Ditch, and expected to take the water around to Quartz Mountain for the purpose of operating a gold mill—not, of course, to furnish power but to furnish water for the plates. This mining company built a beautiful residence on top of Quartz Mountain

that had a view of all the country for a hundred miles, with verandas all around it, glassed in and made comfortable from the winds and weather of that lonely peak. They had eight or ten bedrooms, a good cellar well filled with plenty to drink, and patiently waited for the completion of the ditch, when the opening of that "hole in the ground" would be an epoch in the history of what was then Fresno, but now Madera county. The ditch was completed and then the trouble began. They started a small sawmill to cut the lumber for the flumes on their ditch line and were so indiscreet as to cut timber off government land. They were arrested for so doing by a Deputy United States Marshal and were taken before the district court in San Francisco, but were released upon $10,000 cash bail. These Frenchmen probably pined for the sights of Paris, for they forfeited their bail bond, and have never been heard of since. But they left the "old French ditch" there, and in 1905 the present management opened it up and used part of it in the building of the No. 3 plant, which was finished in 1906.

ELECTRIC HAMMERHEAD CRANES

(The industrial application of electricity is ever becoming a more important factor in large scale construction. The following tells of a recently developed electric crane which did much to make possible the increased war output of Western shipyards. —The Editor.)

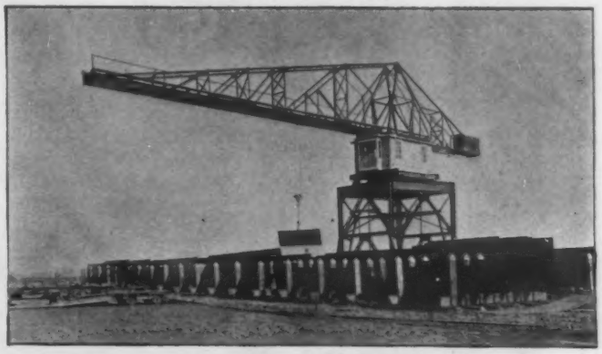
The great demand for machinery of all kinds brought about by the Great War compelled Pacific Coast industries to look to local manufacturers for machines of various sorts. Important among the labor saving devices used in large numbers, especially by shipbuilders and lumber mills, are electric cranes.

To partly fulfill the needs of these industries, the Northwest Engineering Corporation of Portland developed a line of electric cranes commonly called "hammerhead cranes." These cranes have a track travel speed of 300 to 400 feet per minute, a hoisting speed of 60 feet per minute with 5-ton load on two parts of line, and 30 feet per minute with 10-ton load on four parts of line. The trolley with load may be traveled along the boom at 100 feet per minute and the entire upper structure can be revolved through a complete circle in about one minute.

The maximum radius of the hook is 80 feet and these cranes have been designed and built for two capacities, 5 tons and 3 tons, at this radius. Corresponding maximum capacities at 40 feet radius are 10 tons and 5 tons, respectively.

All of the functions of this type of crane are performed by a single 50-hp. motor through gears and clutches. The entire mechanism as shown in the detail view of the machinery was designed especially for these cranes, which accounts for the extreme compactness and ready accessibility. The entire mechanism of each crane was assembled in the shop so as to insure speedy and proper erection.

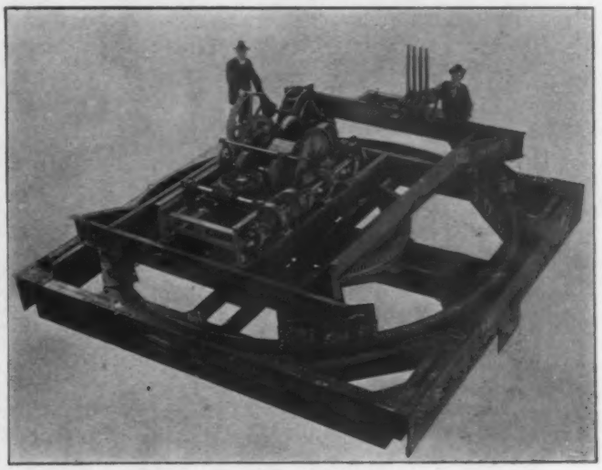
Most of the cranes built have been for 440 volts, 3-phase, 60-cycle current, although 220 volts direct current was used on several. In all cases the current is supplied to the crane by means of trolley wires enclosed in a conduit below the level of the rail. An extremely rugged box shaped collector arm fitted with trolley wheels or sliding shoes is used to make



The above crane is used by a large Oakland shipyard for unloading and storing plates in racks. The crane travels on a wide gauge track, either 16 or 20-ft. gauge. The lower part, or portal pier, upon which the upper structure including the operating machinery and house revolves, is designed to allow standard gauge cars to pass through.

contact with the trolley wires. The box-shaped arm also serves as a conduit for the wires leading up to the motor.

Heavy split brass collector rings are used with controller type fingers to carry the current from the lower to the upper rotating part of the crane. These



Assembled view of machinery showing motor, hoist, rotating frame and portal deck of the electric hammer-head crane.

rings are supported on insulating blocks surrounding the central king pin castings of the crane.

An automatic oil switch with no voltage release is used as a part of alternating current equipments, and a carbon break circuit breaker with no voltage release is used with direct current cranes. All wiring is placed in iron conduit with approved outlets.

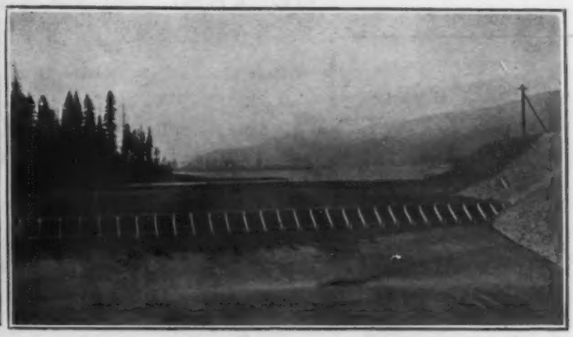
25% of the orchard fruit of the nation is grown in the West, and 17% of the wheat, with similar records for other food products. The raw materials are here.

FORWARD WESTERN INDUSTRY!

More Power for Western Development

The new Caribou plant of the Great Western Power Company will have an initial installed capacity of 59,000 hp. and an ultimate capacity of 176,000 hp. The construction involves diverting water from Lake Almanor through 2 miles of rock tunnel to Butt Creek, where a dam will store 600 acre-feet of water, and returning it by other tunnels to the Feather River about 10 miles below Lake Almanor. The view above shows the Feather River at the location of the power house. Other views of the same project are shown opposite. The plant is expected to be in operation by March 1, 1921.

Captain H. F. Jackson, general manager of the Great Western Power Company, is standing at the right, while S. L. Shuffleton, western manager of the Stone and Webster Company, in charge of building the Caribou plant, tells Gaskell S. Jacobs, engineer with the California Railroad Commission, of the progress of the work. At Mr. Jacobs' left is R. C. Starr, chief construction engineer of the San Joaquin Light & Power Corporation, who has just completed the company's Kerckhoff installation.



The spillway of Lake Almanor of the Great Western Power Company. Note the great bodies of water ten miles in length above this spillway, all being conserved for power purposes and the driving of industries hundreds of miles away. This lake with its 300,000 acre-feet of storage is at present the largest artificial reservoir in California. Its ultimate capacity of 1,250,000 acre-feet will exceed that impounded by the Assouan Dam of Egypt, thus far the greatest in the world.

James Byers Black, general sales manager of the Great Western Power Company, has that self-satisfied smile as he notes the sign above, "No Passengers Allowed to Ride on This Incline," for he knows whether they ride or not everyone will be carried away by the scenery, and by the vastness of the enterprise which he is showing them.

The two oldest inhabitants on the job. J. M. Howells, chief consulting engineer of the Great Western Power Company, who was the original discoverer of the great series of projects of the Great Western Power Company, including Lake Almanor, and with him, to his left, is C. B. Goon ,an old-time employe of the same company.

H. A. Mangold, on the left, superintendent of power house construction of the Great Western Power Company, and R. C. Starr, chief construction engineer of the San Joaquin Light & Power Corporation, felicitate each other on the work in which they are engaged—the installation of great power plants in the West.

O. W. Peterson, chief field engineer for the Shattuck Construction Company, in charge of building the upper tunnels for the Great Western Power Company's Caribou plant. Mr. Peterson has the contented smile of one who knows that the difficult work of tunnel building, hampered by underground waters, is being efficiently handled.

Looking downstream from the Big Meadows Dam of the Great Western Power Company from Lake Almanor. Note the water that is being discharged from this giant reservoir in the heat of summer to supply the great Las Plumas plant many miles below. Next year this flow will be entirely lacking, as the water will be taken from the lake through tunnels down through the Caribou plant without passing into the native stream at this point.

The Use of Seasonal Advertising

A NATIVE SUN for EVERY NEED
For the Dining Room
B or C types
A NATIVE SUN for EVERY NEED
25 or 40 Watt Frosted
For Sidewall lights
A NATIVE SUN for EVERY NEED
100 Watt Bowl Frosted
For the Kitchen
A NATIVE SUN for EVERY NEED
50 Watt Clear
For the Garage
EDISON MAZDA LAMPS

A man determines your character by looking into your eyes. Remember, your windows are the eyes of your store and its character is judged by your window displays.

While a large number of electrical contractor-dealers take advantage of certain seasons of the year to use seasonal advertising such as Easter, June, spring housecleaning and so on, there is no doubt that they overlook a great number of chances to tie in with local or community happenings at other seasons. One of the large jobbers on the Pacific Coast took advantage of a series of circumstances to put on a seasonal campaign that has attracted wide attention.

The anniversary of the admission of the state of California into the Union, September 9th, is known in that state as Admission Day and is celebrated throughout the state by various civic and county bodies and especially by the Native Sons of the Golden West, a lodge composed of men born in the state of California. The first flag of California when it declared its independence from Mexico carried on it a bear, and as a consequence the bear has played quite an important part in the history and legends of California. Therefore, in determining to launch a campaign for the sale of Edison Mazda lamps which are made in Oakland, California, the manager of the Sales Promotion Bureau of this firm decided to start the campaign in the first week of September and in some way tie in the bear, Native Sons and the lamp in some striking manner.

The result was the "California Native Sun Campaign" and the window cards shown along the border of this article were sent out to the agents selling these lamps with a diagram showing how to set them up to best advantage. The little bears seem to have struck the right keynote as the dealers who have used these bears in advertising have had a big increase in business and have aroused a great deal of interest on the part of the general public. This is indicated by the many requests by men and women for reproductions of the little bears in the shape of souvenirs the dealers could give away.

This display ties in with all the essentials of an effective display as stated by H. W. Angus in his articles on "Advertising," now appearing in the Journal of Electricity. He states, "The general weakness of contractor-dealers' window displays is lack of unity, non-use of color, lack of display cards and no seasonal tie-in." The whole idea of the "Native Sun Campaign" is for better lighting with the proper lamp suggested for each use. The suggested arrangement of the window is to use the display cards, which are in orange, black and white, and tie in with a local affair as explained above.

There should be more of this seasonal advertising which is local in character. In cases where the jobber covers such a wide territory that his advertising suggestions do not apply to local conditions the contractor-dealer should exercise some ingenuity and bear in mind that, while the windows in his store were originally intended simply to let in light, they can be put to work and made to earn enough to pay for the rent of his store.

A NATIVE SUN for EVERY NEED
For the Bathroom
A NATIVE SUN for EVERY NEED
For the Bedroom
A NATIVE SUN for EVERY NEED
For the Living Room
A NATIVE SUN for EVERY NEED
For the Breakfast
10 Watt Clear
EDISON MAZDA LAMPS

Seasonal advertising must also tie in with some national campaign to secure the best results. These tie in with the campaign for better lighting now being carried on.

Advertising

BY HOWARD ANGUS

(Newspaper advertising is not the whole story of advertising. Among important supplementary work is direct advertising, the various forms of which are here taken up by the Secretary of the California Cooperative Campaign, in the fourth of his series of articles on the subject.—The Editor.)

Direct advertising embraces that literature distributed from the store by hand and through the mail. To use only newspaper advertising without this medium places the advertiser in much the same position as a fighter who goes into a scrap with one

Blue Bird
ELECTRIC CLOTHES WASHER

VALLEY ELECTRICAL SUPPLY CO.
HEADQUARTERS FOR THINGS ELECTRICAL
FRESNO, CALIFORNIA

August, 31, 1920

Mrs. H.J.Blank
101-Tenth Street
Fresno,Calif

My Dear Mrs Blank;

We are taking this opportunity of introducing, in advance, our Mr. Knowles, who will call upon you in a few days.

The purpose of his visit is to exchange ideas, as well as gather information regarding "Home Service". We think he will prove very interesting, and trust that you will give him a few minutes of your valuable time.

Thanking you in advance, we are

Yours very truly,

VALLEY ELECTRICAL SUPPLY CO.

By Stuart Rogers

SR:LH

A letter sent out by an up-to-date electrical dealer to prospects for electric clothes washers. A brief, neat letter of this type arriving through the mail is sure to command attention.

hand tied behind his back. The two go together and are closely allied.

Direct Advertising

This phase of advertising can be divided as to customers into three classes—to the public generally, to prospects, and to old customers. Distribution to the public generally is by hand, such as placing it in automobiles or taking it from door to door and through large mailing lists secured from the telephone directory, newspapers and the like. Distribution to prospects is distribution to people you have found interested in appliances or wiring. Distribution to old customers would be distribution to those who have purchased something from your store.

Practically all this literature, with the possible exception of letters, can be secured from electrical supply jobbers and manufacturers without any cost to you—a tremendous financial advantage and something which should be deeply appreciated. To leave this literature lying in your basement is the height of extravagance. It is of importance to you and the electrical industry only if people read it; otherwise a great deal of money has been wasted.

Distributing Literature From the Store

Literature can be distributed from a store satisfactorily by several methods. One is by means of advertising racks placed on the counter, on show cases, on the walls and in cozy corners. In these racks various booklets furnished by the jobbers and manufacturers can be displayed and the customers allowed to help themselves.

This means of distribution is effective for the simple reason that people taking literature are interested, otherwise they would not take it. The reading is guaranteed. Another effective distribution from the store can be secured by wrapping literature in every package sent out. This, preferably, should be literature on other appliances than those sold to the customer. Having bought one or several appliances the customer should be interested in others. This distribution is effective for the simple reason that people usually read or at least glance at literature found in packages. A rack can be conveniently placed under the wrapping counter for use by the sales people. Another means that has been found satisfactory is to frame manufacturers' advertising posters on the walls. These can be framed with wall molding without any glass at little expense. Your walls then talk, and as most of these posters show somebody using the appliance, sell the service that is rendered by the article. Incidentally your bare walls are decorated, adding to the attractiveness of the store.

Probably as effective a means as any of distributing literature by hand is to have your solicitors leave literature with the people on whom they call. Some dealers use boys to place literature in automobiles parked on business streets of the town. If pamphlets are laid on the seats of the automobile, people have to pick them up to get rid of them and they instinctively glance at them. Others use men or boys to go from house to house leaving their literature. Usually boys can be employed for this after school hours or during their vacation at a nominal cost.

Distribution By Mail

For mail distribution you must have a mailing list. This mailing list, to be of any value to you, must be kept up to date. This mailing list should be divided at least into two parts, one consisting of customers and the other of prospects. The names of your customers can be obtained by your salesmen and from your billing list. All customers are live prospects for every appliance they have not purchased, and after they have purchased every appliance you have to sell, they are still prospects for replacements. Contractor-dealers are prone to neglect their customers, forgetting that they are the livest

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The great reserves of the Orient are shipped first to the Pacific Coast and add to its store of raw materials.

FORWARD WESTERN INDUSTRY!

of prospects, and spend all their efforts on people who have never been into their store. Customers should receive literature at least four times a year, which in general divides the year into the four seasons of spring, summer, fall and winter, each having its particular appliances suitable to the time. You can in this manner keep very close to your customers, and have them always familiar with your merchandise. In addition to your literature they should receive such articles as a calendar and any advertising notebooks distributed. There are two clothing stores from whom I receive advertising literature in the spring and in the fall. From one of these I receive a pocket notebook. My vanity is pleased with the attention shown, and as a natural result I purchase my wearing apparel from them. What these clothing stores are accomplishing with me and others like me, you can accomplish. Your customers should receive all notices of sales. You should think of them when you have a bargain as well as something that is difficult to move. Some will come to buy, probably most of them will not. But they will be pleased to know that you are thinking of their interests and that will result in the purchase of more appliances.

Compiling a List of Prospects

Your prospect list can be gathered by having salesmen take the names of those who make inquiries in your store for articles but do not purchase, from names turned in by your solicitors, from building permits and by exchange with some other merchants such as a furniture store. A dealer-only can secure an excellent list of prospects from a contractor-only. The contractor-only can secure excellent prospects on wiring from a dealer-only. There is a possibility for a fair and mutually advantageous exchange. If your store is run according to departments such as contracting, large appliances, lamps, motors, any customer who purchases an article from one of these can be immediately considered a prospect for each of the other departments, and his name and address listed as such. Not enough contractor-dealers tie together their contracting and dealing departments. You will wire a home and then never bother to follow it up with selling efforts on appliances and thereby overlook one of the finest opportunities to increase your business. All of these prospects should receive literature and letters, explaining the service of electricity, its economy, convenience, and labor-saving features with an appeal to women's pride. Your letters are worthy of your most careful attention and should be brief and to the point. Remember, people will read a sentence when they will not a paragraph, a paragraph when they will not a page, and practically nobody will read a two-page letter. Once a prospect has purchased an article in any department, he should be transferred from the prospect to the customer list.

Your letter heads are an advertising medium. If they are so arranged that they catch the eye, awaken interest and state a short, brief, cardinal fact about your business—they will do much to spread the story of your store. People will read a letter head who will never glance at the body of the letter before consigning it to the waste paper basket.

Featuring Suds

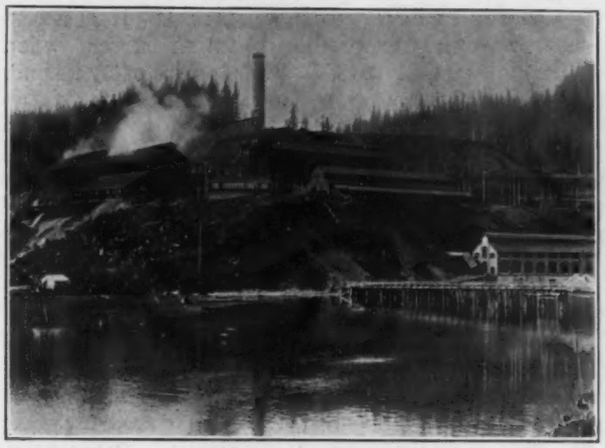
Even the movies helped a certain dealer of Southern California to put over his washing machine campaign. Nothing attracts more attention in Santa Barbara than the name or picture of a Universal City queen and so Nelson & Smith, electrical dealers of that city, made capital of the fact that they and Mary Pickford happened to be featuring "Suds" at the same time. Not only did the above window attract attention but an Eden machine especially arranged so as to generate an amazing amount of glistening "Suds," helped to draw crowds to the door of the theatre which was featuring that particular substance.

Hydraulic Equipment of Granby Mine

BY CHAS. H. TALLANT

(The development of power to serve special needs has some interesting examples in connection with the mining industry. The following account by a member of the Pelton Water Wheel Company describes the special features of an interesting installation in the Northwest.—The Editor.)

Several notable examples of extensive water-power utilization by large mining companies are found on the Pacific Coast, each one having decidedly interesting features. One of these is the installation



View of buildings at the Granby works. The power plant is lower right, and the smelter at the left.

of the Granby Consolidated Mining, Smelting and Power Company, Anyox, British Columbia, in which hydraulic power, developed by Pelton turbines, is used exclusively as the primary power.

The hydraulic development of the Granby plant was made for the purpose of providing power for the operation of a pyritic copper smelting plant, with a capacity for the reduction of 2,000 tons of copper ore per 24-hour day.

Water Source

The power development utilizes the water of Falls Creek, a stream of considerable magnitude flowing generally in an easterly direction from the point of water intake and emptying into what was formerly known as Goose Bay—now Granby Bay. The stream drains a considerable mountainous, snow-capped area which, with the available water storage capacity, can be depended upon for a continuous flow of approximately 180 cu. ft. per second.

The point of water diversion was placed at a sharp bend in the creek, where the natural topography offers an exceptional opportunity for the creation of a large water storage basin as well as particularly favorable spillway conditions, by the installation of a comparatively simple and inexpensive rock-filled, timber crib dam.

The water is diverted through a continuous wood stave pipe line, 6ft. in diameter and some 6000 ft. in length, laid on a good average grade and closely following the hillside contour to a point directly above the smelter proper. From here riveted sheet steel pipe is used for an abrupt drop to the power house, situated so that the tail water discharge from the various turbine units flow directly into the waters of Granby Bay.

Details of Installation

The power house proper is 50 ft. wide and 180 ft. long. It contains five hydraulic turbine-driven air machines for supplying air at various volumes and pressures for the operation of the mine and smelter, and two hydraulic turbine-driven generators, for supplying energy for the operation of the electric locomotive haulage system and the various electrical equipment used in the smelter operations.

As the diameters of the various turbine units in the power house vary from 40 inches to 23 feet, and the operating conditions made it advisable to maintain the floor of the power house upon continuous level, the elevations of the nozzles which supply water to the various turbines vary to a considerable extent. However, the average effective head, friction loss in the pipe line deducted, under which all the equipments at the power house operate, is 375 feet.

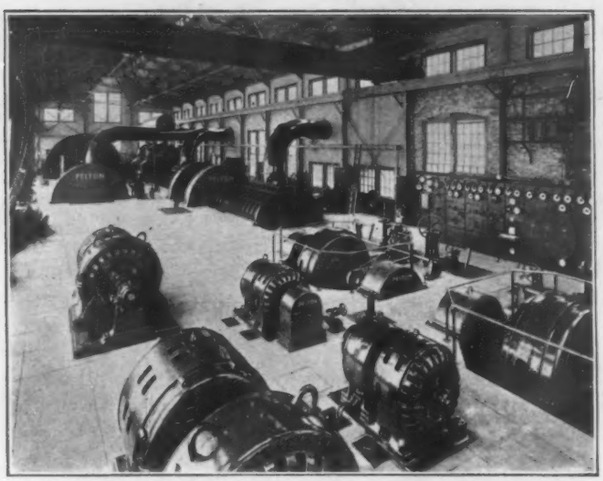
As is the case in practically all the streams in the northern part of British Columbia, the water flow of Falls Creek is quite variable throughout the year, depending largely upon the temperature conditions. This variation in stream flow has been compensated for, as far as possible, by the provision of water storage above the pipe line intake and dam. In order

Exterior of the Granby power house showing the forked water line at the right and the air pressure lines in the center.

to limit the quantity of water used by the various turbine equipments to exactly that needed for the development of power at any particular time, the various equipments are provided with auxiliary relief

Shipping raw materials to the East and returning the finished product means two freight charges. Freight rates are high.
FORWARD WESTERN INDUSTRY!

water economizing nozzles. By means of these nozzles automatic governor control of the exact water supply to the various units is provided and all water not actually required for the development of useful



Interior view of the Granby power house, showing the various hydraulic turbine-driven machines. Note the main units set below the floor level.

work at the power house is conserved within its storage reservoir at the head of the pipe line.

The main blast furnace air supply for the smelter is provided by three Connersville positive blowers, one of which is a spare. Each of these blowers has a maximum delivery capacity of 40,000 cu. ft. of free air per minute against a pressure of 32 ounces, when operating at a speed of 115 r.p.m. These blowers are operated by direct-connected Pelton impulse turbines 14 feet in diameter, producing a normal output of 625 hp. and capable of a maximum capacity of 775 hp.

The air required for blowing the Bessemer converters used in the refining of the copper matte at the smelter is provided by means of a Nordberg variable capacity, 2-stage, hydraulic turbine-driven blowing engine, with a delivery capacity of 12,000 cu. ft. of free air against a maximum pressure of 18 lbs. per sq. inch, when operating at a speed of 75 r.p.m. This blowing engine has an impulse turbine about 23 ft. in diameter directly mounted upon its crank shaft. The construction of the turbine unit was accurately carried out so that the turbine runner provides the requisite energy storage or flywheel effect to insure the smooth operation of the blowing engine, as well as the power for the entire equipment. The blowing engine is the reciprocating type.

The great need for simple flywheel effect in a machine of this kind will perhaps be better appreciated when it is known that under the smelter operating conditions, the turbine unit, with a maximum capacity of 1400 hp., is subject to an abrupt change in output from no load to full load and this may occur from 10 to 12 times every hour.

The compressor which supplies the necessary air under pressure for the operation of drills and other compressed air tools at the mine and elsewhere on the property, is of the Nordberg two-stage reciprocating type and is capable of compressing about 4000 cubic feet of free air per minute to a pressure of 100 lbs. per square inch when operating at a normal speed of 84 r.p.m.

Power House Operation

The power house end of the plant contains two double overhung impulse turbine units, each direct connected to a 938-kva,, 400 r.p.m., alternating current type Westinghouse generator. These turbine units develop a normal output of 1100 hp., while having a maximum capacity of 1400 hp.

The excitation of the generators during operation is accomplished by motor-generator sets, receiving energy from the main generators. It is necessary, however, to provide excitation current when starting the plant and this is taken care of by a small water motor direct-connected to the shaft of the motor-generator set. The water motor is started at the outset and supplied with water until the main generators are up to speed. Current is then thrown into the electric motor and it picks up the load, while the water is shut off from the water motor, allowing it to idle on the shaft, carrying no load.

Since it was found advisable to maintain the floor of the power house on one continuous level throughout, and owing to the large wheel diameters used for the various direct- connected turbine-driven units, the height of the power house floor has been carried through an elevation which would occasion the loss of considerable of the effective water head were the electrical units placed above it. In order to correct this as much as possible, and to obtain the greatest output from the electrical equipments consistent with the installation generally, the electrical units were depressed below the normal floor level as much as possible.

The automatic speed control of all units in the power house is accomplished by means of self-contained oil pressure governors which maintain the uniform speed of their individual turbine units by decreasing or increasing the size of the power jet impinging upon the turbine buckets. In thus automatically controlling the speeds of the units through the control of the volume of water delivered to them, the water supply is thoroughly conserved and thus made available to carry short peak loads which would otherwise be beyond the capacity of the plant. The time in which the governors must act in shutting off or increasing the supply of water to their respective turbines is very short, in order to provide proper speed regulation. In fact, all of the governors make their full strokes in three seconds or less.

It may be easily imagined what the effect would be upon the pipe line, if provision were not made in the automatic action of the governing apparatus to prevent excessive rise of pressure in the pipe line due to water ram, when for instance, the 1400-hp. turbine direct-connected to the blowing engine had its complete supply of water shut off by the governor. The pipe line is, however, thoroughly protected against any danger from this source by the use of automatically operated auxiliary relief nozzles simultaneously controlled by the automatic speed governors with the volume control of the power nozzles. In the event of a change of load occurring in such

manner as to require a very rapid decrease in the volume discharged from the power nozzle, the auxiliary relief nozzle rapidly opens and momentarily provides a discharge outlet for the water which has been playing upon the buckets. The relief nozzle then automatically and slowly returns to its closed position at a rate of speed which can be adjusted to present undue pressure rise in the pipe line and which is also entirely independent of the rate of motion of the governor.

Each of the turbine units is provided with a main stop gate valve provided with a by-pass and suitable gearing proportioned so that one man can without difficulty operate even the largest gate in the power house when it is under the full pressure of the pipe line.

Full provision has been made throughout the plant for facility in the removal of any wearing parts and with a view to providing a high degree of continuous twenty-four hour a day service which is necessarily required in the operation of a pyritic smelting installation.

Problem Course in Electricity

BY H. H. BLISS

(The calculation of power, and the relation of the various terms in which power is expressed, are taken up here in the fifth article of the practical electricity series. Appended problems bring out the principles stated in the text. The author is on the staff of Riverside Junior College, Riverside, California.—The Editor.)

POWER AND EFFICIENCY

Calculating with Watts.—It is found by experiment that a certain engine can drive one generator that gives a current of 100 amperes with a pressure

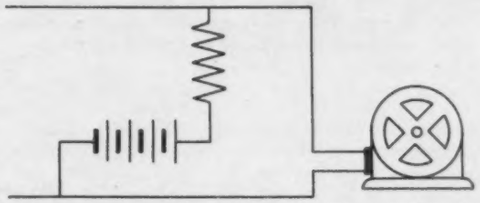


Fig. A. Diagram illustrating method of inserting sufficient resistance in series with a battery to limit the current.

of 500 volts, or another generator that gives 200 amperes at 250 volts, or a third that gives 1000 amperes at 50 volts. The power is the same in each case; you will note that the product of volts times amperes is 50,000 each time. It might be said that electric power = 50,000 "volt-amperes" but the common expression is 50,000 "watts." **In a direct current circuit the Number of Watts = Number of Volts across the Circuit × Number of Amperes Flowing.**

The same product expresses the number of watts of power in an alternating current circuit, provided there are no complications due to condensers, coils or long lines; in other words, the formula applies to all ordinary lighting and heating circuits but not to those containing alternating current motors or transformers. In any circuit:

Power = Pressure × Current × Power Factor, the power factor being 100% or less, depending on circumstances.

If a lamp takes 1/3 ampere at 120 volts, its "wattage" is 1/3 × 120 = **40.** How many amperes flow through a motor taking 1760 watts on a 440 volt circuit? Since watts = volts × amperes; amperes = watts/volts = 1760/440 = **4 amperes,** answer.

The "watt formula" can be rearranged for use in finding volts or amperes, just as Ohm's Law could be rearranged for different purposes. To find the voltage to apply to a 550 watt iron taking 2.5 amperes, we divide watts by amperes: 550/2.5 = 220 **volts.** In such cases it is best to check the solution by trying the original "watt formula"; here 220 × 2.5 = 550; in the example above, 4 × 440 = 1760.

Kilowatts, Horsepower, Kilovolt-amperes.—Except with such small apparatus as heaters, lamps, telephone apparatus and fractional horsepower motors, the watt is too small a unit for convenience. Hence we perform most power calculations in terms of the "kilowatt" (1000 watts). In certain cases it is necessary to convert kilowatts to horsepower and **vice versa,** which is most conveniently done if one remembers that 1 hp. (horsepower) = 3/4 of 1 kw. (kilowatt) very nearly, and hence 1 kw. = 4/3 of 1 hp.

Another unit frequently mentioned in connection with a.c. apparatus is the "kilovolt ampere." One "kilovolt" equals 1000 volts. If a 6000-volt generator is capable of supplying 80 amperes it is rated at 6 × 80, or 480 kva. (kilovolt-amperes). Its load

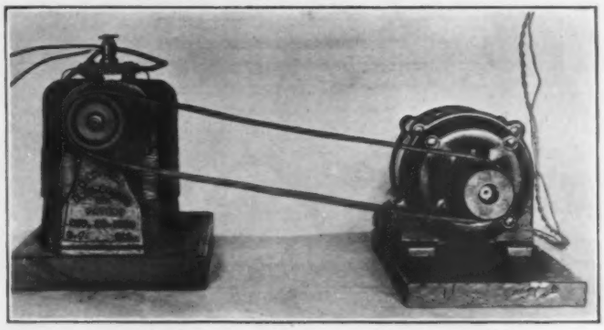


Fig. B. Motor generator set used for experiment in the evening electrical class at the San Francisco Polytechnic High School

may be 480 kw. if the power factor is 100%, or less, if the power factor is lower.

In a certain circuit the electrical hp. = 56 and the power factor = 60%; find the kva. We first change the power to kw.: ¾ of 56 = 42. Then, since

The major reserves of the nation's standing timber are found in the Pacific Northwest. The tremendous natural resources of this region have just begun to be developed.

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the kw. = kva. × power factor, the kva. = 42 ÷ .60 = **70.**

Observe carefully the fact that the number of kw. is always **less** than the number of hp. representing the same power, since the kilowatt is a larger unit (the number of miles between San Francisco and Los Angeles is less than the number of feet). Since it is 4/3 as large a unit, there are only ¾ as many of the kilowatts. Keeping this point clearly in mind will help in making transformations from one kind of unit to another.

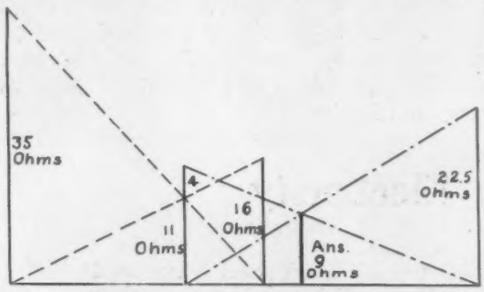


Fig. C. Diagram showing solution of problem 43. 16 and 35 ohms in multiple give an equivalent resistance of approximately 11 ohms; add 4 in series and find total for magnet, toaster and grid = 15 ohms. This in parallel with 22.5 gives 9 ohms for the whole combination.

Electrical Efficiency.—If a man has to charge a storage battery which takes 40 amperes at 110 volts, and has a 550-volt d.c. line available, he can do it by inserting sufficient resistance in series with the battery to limit the current. (See Fig. A.) He would have to produce a "drop" of 440 volts in the resistance, when 40 amperes flow. Therefore he would need 11 ohms. This system has been used commercially, but it is generally disapproved as "inefficient."

A better scheme is to use a 550-volt motor, "direct-connected" to a 110-volt generator. This kind of combination, generally known as an "M-G set," is very much used for giving a different voltage or producing direct current from an a.c. supply, as for electric railways, battery charging, or running a motion picture projector.

The number of watts taken by the motor is called the "input" to the combination; the "output" of this M-G set would be the watts given out by the generator. With the figures given, the output = 40 × 110 = 4400 watts. **The output of any machine or system of machines is always less than the input.** This statement has been proved by hundreds of thousands of tests and experiments upon all sorts of devices. Hence the input to our M-G set is more than 4400 watts—probably about 7000 watts.

The "efficiency" of a machine is defined as the answer obtained by dividing the output of a machine by the input, or **"efficiency = output ÷ input."** Our M-G set has an efficiency of 4400/7000 or .63, generally written "63 per cent" or "63%." To the engineer efficiency means power delivered ÷ power taken in, or the percentage of a watt given out by an appliance for each watt consumed by it.

If we know the efficiency and input of a machine, we readily calculate the output by multiplying the two known factors. Similarly, we can find the input by dividing the output by the efficiency, when these two things are known.

Answers to Problems on Multiple Circuits

33. Voltage = 1.25 × 92 = 115; heater current = 115/24 = 4.79; line current = sum = **6.04 amperes.**

34. 485/5 = **97 ohms;** 110/97 = **1.134 amperes.**

35. From alignment chart, 10 and 2.5 give 2 ohms, hence combined resistance = **.002 ohms.** Voltage drop across meter = 12 × .01 = .12 volt; current = .12/.002 = **60 amperes.**

36. 2.5 × (7 + 29) = 90 volts; 90/18 = 5 amperes; 5 + 2.5 = **7.5 amperes.**

37. Volts = 3.6 × 30 = 108; B takes 4.5 amperes; total current = **10.8 amperes;** equivalent resistance = 108/10.8 = **10 ohms.**

38. Second lamp takes **1.5 amperes.** Drop = 3.6 × 1.6 = 5.76; generator voltage = **113.76 volts.**

39. Lamp resistances are **51.4** and **72 ohms.** 108/3.6 = 30 ohms; 30 + 1.6 = **31.6 ohms** for circuit.

40. Trolley resistance = .093; feeder, .045; combined resistance = .0303 ohm. Track resistance = .021; total = .021 + .0303 = .0513. Drop = 130 × .0513 = **6.7 volts.**

41. First reading = **60 volts.** Two lamps in parallel have 80 ohms; total resistance then = 80+ 160 = 240 ohms; current = .5 ampere; .5 × 160 = **80 volts.**

42. Coils are in series for "low heat"; total resistance = 220/.86 = 256 ohms. Medium coil has 220/2.75 = **80 ohms;** the other has 256 — 80 = **176 ohms.** Current taken by second coil on 220 volts = 220/176 = 1.25 amperes. For "high heat" coils are in multiple and total current = 1.25 + 2.75 = 4 amperes.

43. 16 and 35 ohms in multiple give an equivalent resistance of approximately 11 ohms; add 4 in series and find total for magnet, toaster and grid = 15 ohms. This in parallel with 22.5 gives **9 ohms** for the whole combination. (See Fig. C.)

44. 24/.1 = 240 ohms; 240 — 83 — 37 = **120 ohms** in the lamp. By alignment chart, lamp and shunt give 30 ohms; 30 + 83 + 37 = **150 ohms.**

45. Man and one lamp in parallel have equivalent resistance = 1000 ohms; total resistance = 3400 ohms; amperes = 221/3400 = .065. Drop in outer lamps = .065 × 2400 = 156 volts, leaving 65 volts across man; current = 65/6000 × **.0108 ampere.** If lamp burns out his current increases to 221/8400 = **.0263 ampere.**

Power Problems

46. What current flows through each of the following pieces of 220-volt apparatus? 15-watt lamp, 500-watt iron, 440-watt cooking unit?

47. What current is taken by a 27.5 ohm heater on a 110-volt circuit? How many watts? How many kw.? How many electrical hp.?

48. What current flows if 11,000 kw. are transmitted on two wires at 100,000 volts and 80% power factor?

49. A certain sewing machine motor takes 4 amperes and .12 kw. on a d.c. circuit. What is the voltage?

50. A 440-volt a.c. motor has an input of 19 kw. at a power factor of 90%. What current does it take?

51. This motor is 85% efficient. What is its output in kw. and hp.?

52. This same motor is direct-connected to a 150-volt d.c. generator which supplies to a storage battery a current of 92.7 amperes. Find the efficiency of the generator and the efficiency of the M-G set.

53. There are connected in series across a 110-volt circuit one heater of 20 ohms resistance, one resistance coil of 11 ohms, and three pieces of wire of .2 ohm each. Find the power used in the heater.

54. What current flows for a load of 45 kva. at 2300 volts and 90% power factor?

55. In Fig. B is shown an experimental M-G set. The a.c. motor (at the right) takes 6 amperes at 230 volts and 72% power factor. Find the current output from the 60-volt d.c. generator if the efficiency of the set is 57%.

56. A motor draws a current of 40 amperes through two line wires of .4 ohm each connected to a 220-volt gen-

erator. Find the power output of the generator, the input to the motor and the efficiency of the transmission.

57. What is the power factor in a transmission line where the kw. = 9,600, the voltage = 150,000 and the current = 80?

58. A long piece of "Nichrome" resistance wire is connected across a 224-volt circuit. It absorbs 1.8 kw. of power. Find the resistance of the wire.

59. Three electric lamps, of 200 ohms, 240 ohms, and 810 ohms respectively, are connected in multiple. Together they take 1.15 amperes. Find the circuit voltage and the power to each lamp.

60. Find the resistances of the following 110-volt lamps: 10 watt; 25 watt; 60 watt; 100 watt.

MAKING ONE SALE INTO TWO

BY M. T. DOLMAN

(Do you make the best of your selling opportunities? The following hints to contractor-dealers by the manager of the Sales Promotion Bureau of the Pacific States Electric Company indicate that the customer does not necessarily think of asking for everything he wants.—The Editor.)

"Need a tooth brush, sir?"

How many of you contractor-dealers have had that question shot at you by the clerk in the up-to-date drug store when you asked for a certain make of tooth paste, or powder?

That question was put as the clerk showed you the package of paste you had asked for, preparatory to wrapping it up for you. As he started toward the wrapping desk, the chances are that the clerk also reached for a bottle of mouth wash and showed you that, saying a few words in recommendation. Maybe you bought the brush, suddenly remembering that yours was rather worn and you would need a new one soon, anyhow. Or maybe you bought the mouth wash. Again, maybe you didn't buy either. Yet the chances are that, if the clerk was at all tactful when he made the suggestions he wrote two items on his check instead of one and drew down an extra p.m. as a result. That was salesmanship, in one of its neatest forms. That sort of salesmanship has put the drug stores into the "million-dollar-turn-over" class and given them a position in the retail world they never occupied before.

A man walks into a dealer's store and asks for some lamps. (Bulbs, he calls them, for the public hasn't yet been thoroughly unsold on that word as applied to electric lamps.) What do you do, or what does the clerk do? Most likely what I've seen many of them do. He reaches for a 25 or 40-watt clear, B Type lamp and proceeds to wrap it up, telling the customer the price. Out goes Mr. Customer and for weeks thereafter cusses electric lights. Never a word was asked as to where the customer intended to use those lamps, nor any effort made to sell the new White Mazda. Two lamps were sold—two lamps only. Not even good will was promoted, either for the lamps, the electrical industry or the dealer.

Now that is what had been happening daily in the store of a certain dealer whom I happened to visit one day, when just such a transaction as I have described, transpired. The "boss" of the store was busy figuring a wiring job. The clerk (I can't dignify him by calling him a salesman) didn't know his business, though he had been working for that dealer for three years. Both "boss" and employe were to blame—mostly the "boss."

I stood beside the counter where the man asked for the lamps and said nothing, until the clerk left to wrap up the lamps. Then, picking up a White Mazda which, as it happened, was lying on the counter, I said,

"Have you ever seen this lamp before? It's the very last word in electric lamps. Gives you a clear, well defined light for reading, yet, because of its character has none of the glare attendant on clear lamps."

He was interested, and never even stopped to ask who I was, or to notice that I wore my hat and was evidently a stranger and not part of the dealer's organization.

I stepped behind the counter and lighted the White Mazda for him. His face lit up in a smile and he said:

"That's just what I want. I want those bulbs for a living room table lamp, to read by."

"Best thing in the world for that," I said. "You take my advice. Take along half a dozen. Put two or three in your reading lamp. Put some in your bed room. Above all, put one in your bathroom over the mirror. See how much easier it will be to shave."

By that time the clerk had returned. But the customer said:

"I've changed my mind. This gentleman was showing me this new 'lamp,' as he calls it. I think I'll take half a dozen."

While the clerk was wrapping these up (unfortunately the counter was ten or twelve feet from the counter) I casually remarked:

"Ever have any trouble with your door bell batteries?"

"I should say I do! The darned bell don't work now. I'd forgotten all about it."

Then I explained about the bell ringing transformer. He thanked me and bought that, too.

That evening I remained over in the town, at the request of this particular dealer, who having sensed the transaction had stopped to watch what I did, and talked to him and his sales people. The result of that one little lesson has been to make this dealer one of our biggest sellers of White Mazda lamps, and one of the greatest boosters for small electrical specialties we have on our books. He is giving his salesmen a bonus every time they have two or more items on a check. His volume has doubled, and with it his net profits.

INDUSTRIAL USES OF RADIO

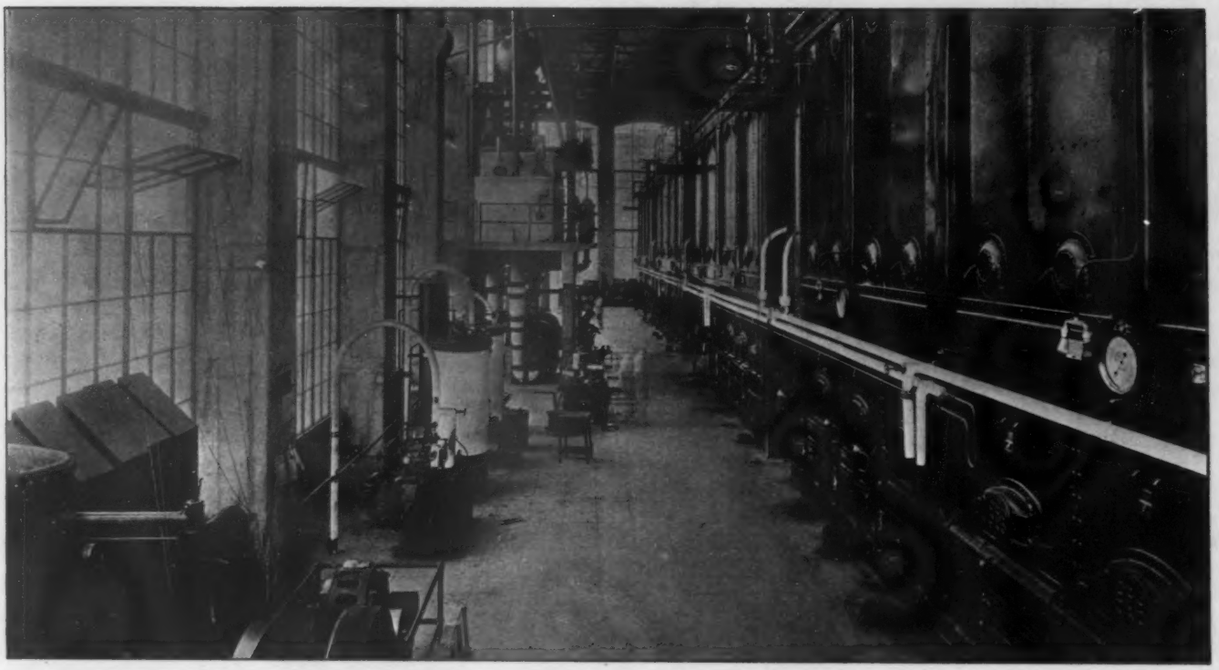
Radio experimenters seem to be bound and determined that distance shall not be considered as a factor in any of our present day processes such as the making of talking machine records. The speaker talks into a high-power instrument which transmits the voice several hundreds of miles to the receiving point where a recorder which engraves the message in soft wax is attached. A record made recently was perfect though a trifle "patchy" when produced.

The tremendous markets of the Orient are most easily reached from the Pacific Coast.

FORWARD WESTERN INDUSTRY!

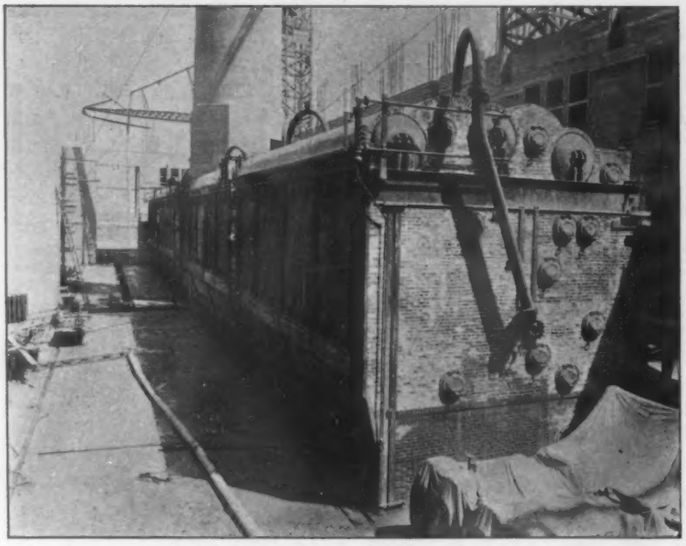
Meeting the Power Shortage in the West

(By means of an unusual network of interconnections, steam power plants are assisting hydro-electric installations to supply the great power demand of the West during these months of shortage. Among the views on these pages, the water softening plant of the Sierra and San Francisco Power Company, the float arrangement at a Southern California Edison Company plant and of an oil fire steam heating station of the Pacific Gas & Electric Company, are of especial interest.—The Editor.)

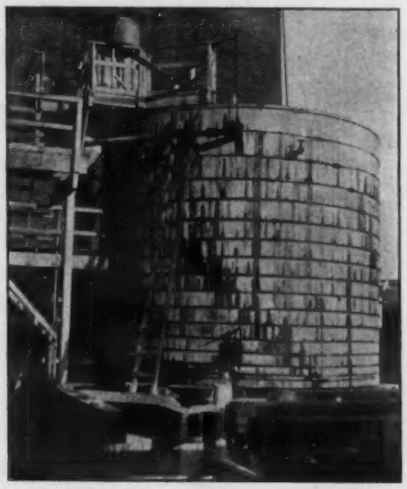


TYPLICAL BOILER ROOM FOR EASY CHANGEOVER FROM OIL TO COAL

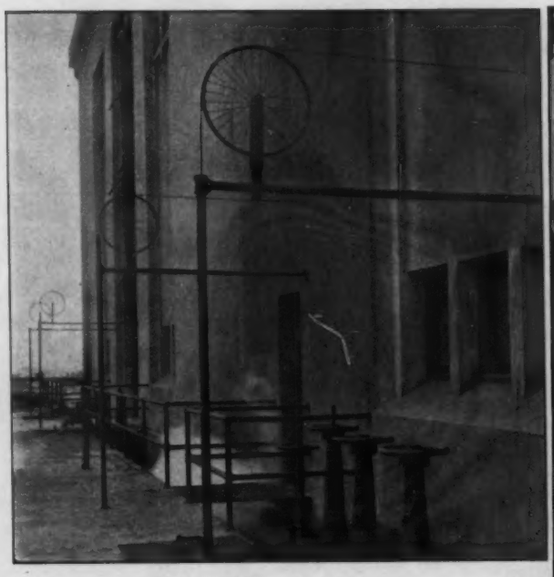
Many power plant operators prefer to so design the fuel oil operation that quick changeover to coal operation may be accomplished should oil later involve less economic operation than coal. The view shown is that of the boiler room of the steam electric plant for the lighting department of the city of Seattle—East Lake Avenue and Highland Place.



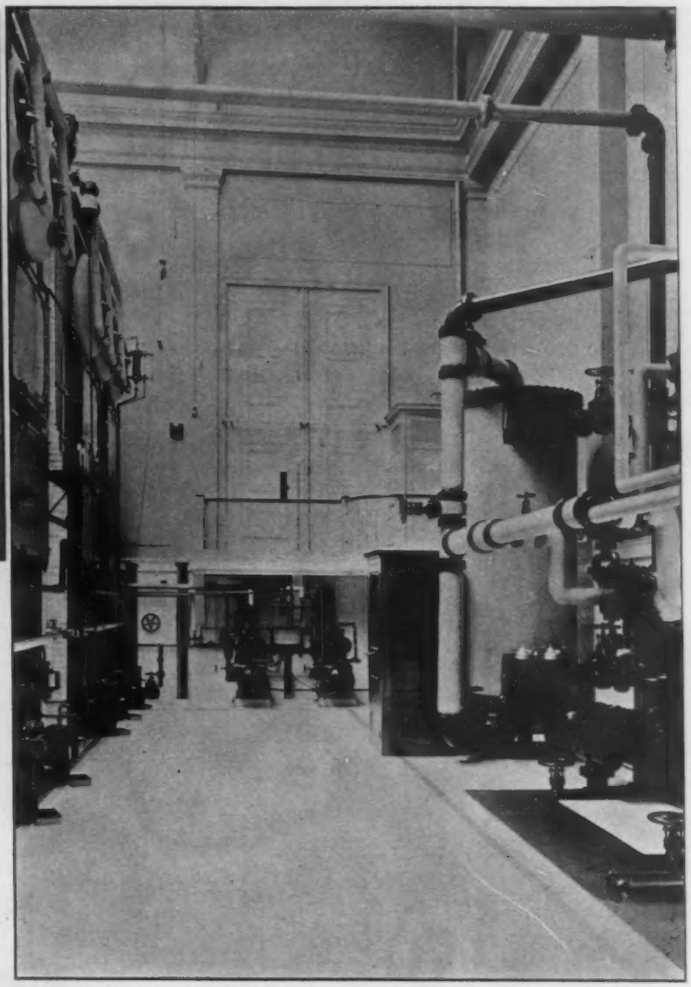
Boiler installation at the Long Beach Plant of the Southern California Edison Company under construction



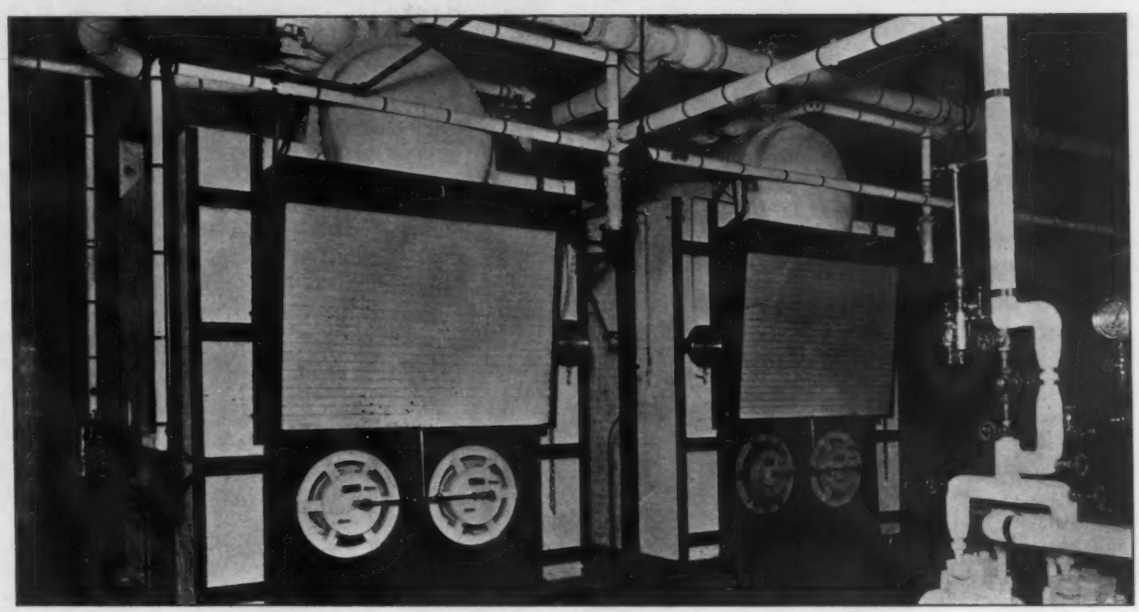
Water softening plant at the Sierra and San Francisco Power Company's 17,000-kw. oil burning station. The use of pure water free from scale-forming matter is the first requisite toward keeping boilers clean.



The above is a view of the float arrangements, showing the valves which control the inlet and outlet of oil from storage tanks of Long Beach Plant, Southern California Edison Company.



The oil-fired steam heating station, Pacific Gas & Electric Company, Station S, San Francisco, is shown to the right. B & W boilers are to the left, fuel oil pumps and heaters in the center of background, feed water pumps and heater to the right.



The mechanical fuel oil atomizers installed under two 250-hp. Heine boilers. The view is the standard equipment at eleven pumping stations of the Shell Company of California Oil Pipe Line, installed by Sanderson and Porter. The operation is entirely automatic, oil being supplied to the burners under the control of the pump governors so as to maintain constant pressure.

A New Plan of Distribution

BY GLEN H. SMITH

(Increased efficiency in the distribution of power is in line with the present need for full utilization of all electric power resources. Following is a description of a new arrangement in the city of Seattle, written by the engineer of outside construction on the Seattle Municipal Light & Power System.—The Editor.)

Some radical changes are to be made in the city distributing system of the Seattle municipal plant as rapidly as present plans can be carried out. Some of the features proposed are different from anything used in any city in the country.

The proposed changes, in brief, consist in changing a 15,000-volt, 2-phase system to 3-phase with 15,000 volts to neutral, and the extension of this

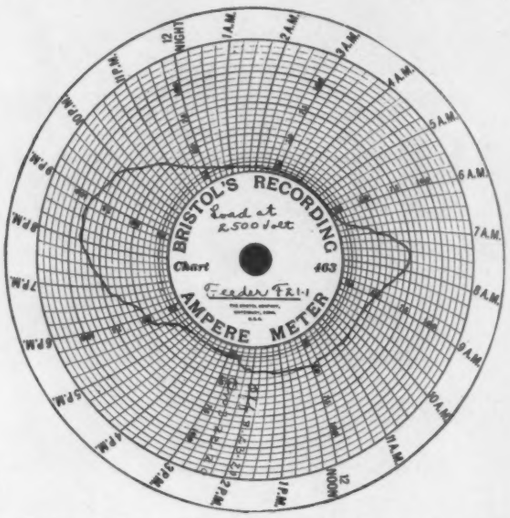


Chart showing current used by district which has been changed to new system

system into each district now served by primary, with the shortening of the primary feeder to a maximum of two or three thousand feet and consequent elimination of the feeder regulator. The idea is to substitute a high voltage system for the long primary feeders, and so subdivide the primary districts that the customer at the feeding point of the district nearest the station will receive the same voltage as the one at the extremity of the most remote district, within the three or four-volt variation permissible on the tungsten lamp.

Details of the New Plan

To illustrate, let us take a typical primary district, such as the University section, and trace the current from generating station to customer on the old and the new plans of distribution. The district uses 750 kilowatts at 120-240 volts single phase for light with about 100 kilowatts of polyphase power—a total of 800 kw. on the lighting phase. Current is taken from the bus at the Lake Union steam plant at 15,000 volts and carried by two-phase line to the Fremont substation, 15,000 feet. The full load regulation on this section of line, which is of No. 2 wire most of the way and designed for 4000 kva., is approximately 4 1/3%, while the drop due to the 800 kilowatts under consideration is 1 2/3% on its phase. At Fremont the current is stepped down to 2500 volts with a drop of 1% and sent through the usual oil switch and automatic induction regulator to the primary feeder. This feeder of two 350,000 C.M. cables, carries the load of 300 amperes 12,000 feet to a distributing center at 14th Avenue Northeast and East 45th Street, with a drop of 15%. From the distributing center a primary network spreads in all directions, reaching an extreme length of 16,000 feet, using wire from No. 0 to No. 6, and giving a voltage drop of 10% from distributing center to extreme end. The distributing transformer adds 2% drop, and the bus and service another 2%, making a grand total of 34.3% to be compensated in order to get constant potential service. Theoretically this can all be

Typical outdoor substation in the residence district

taken care of by regulator and by raising the bus except the 10% from feeding point to the end of the primary, provided that the load comes on at the same time throughout the district. In practice the voltage at the feeding point is raised over the peak to 3% or 4% above the standard voltage, so that the average over the district is correct, with the nearest customers getting high and the farthest low voltage. The abnormal drop of 15% in the feeder itself is partly taken care of by a 10% fixed booster at the substation, the remainder by automatic regulator. It may be noted that the inductive component of this drop is 933 volts against 224 volts due to resistance; also that the feeder wire is by no means overloaded.

Method of Changing

To substitute the new method of distribution for the one outlined above for this district, we change the voltage on the steam plant busses to 15,000 to neutral, 3-phase, or 25,980 volts between wires, take down two wires of the five-wire, two-phase system, and extend the line past the present station, past the

present distributing point and on to within 4000 feet of the end of the primary network. We cut this network into quarters, and install a 250-kw., 26,000 to 2500-volt transformer at the center of each quarter and tie the network to it through a disconnecting switch and take down the heavy feed wires. We now have 1½% drop from steam plant to Fremont, one-third of what we had before, and from Fremont to the old feeding point we have one-fourth of one per cent, instead of 15%, or one-sixtieth of the former drop. From each new feeding point to the end of the primary is now half as far as before, with one-quarter of the current to send in each direction, reducing voltage drop to one-eighth, or 1¼% maximum. This is the drop which can not be compensated for because it is "between consumers." Step down transformers, distributing transformers, secondary bus and service introduce a five per cent drop as before, but this, with the two per cent on the 26,000-volt line, can be compensated by raising the station bus voltage over the peak.

We have reduced the drop between station and customer from 34.2% to 8% with a reduction in power loss from 28% to 8%, and given service to the farthest consumer better than that formerly given at the feeding point. At the same time we have reduced the expense for apparatus including wire, insulators, transformers and regulators, from station to feeding point about 35 per cent and increased the capacity of the circuits from two to thirty-three times.

Advantages of New System

With the new system the entire city will require only three stations, the Skagit step-down station in the north end and Cedar River step-down station in the south, with the steam plant in the center. The busses in the three stations will be regulated for the same voltage by synchronous condensers, regardless of the direction of the flow of power between them. The 15,000-volt system will become simply an overgrown primary system, with transformers placed wherever necessary for the lighting load. Additional circuits will be necessary between stations for tie lines, and the largest power loads will require power lines separate from the lighting circuits.

The operation of such a system is very simple. Each transformer is inspected periodically and graphic load charts taken frequently enough to guard against overload. Each primary district may be tied to the neighboring one when work must be done on 15,000-volt lines or transformers. In cases of short circuit on the primary system, a district must be out until the troubleman can be sent to the district, but the area affected will be only one-fourth as large as formerly. The effect of trouble on the 15,000-volt lines will not change; such trouble will be reduced as construction is improved.

From the safety standpoint the two systems stand equal. Lines of any voltage above 2500 must be killed before they can be handled. The safety depends almost entirely on the class of construction and the care in operating. The reconstruction of old 15,000-volt lines using modern insulators and switches, larger crossarms and better safety factors in general will greatly improve their safety. Insulators of three distinct colors, brown, blue and white, are to be used for designating the three phases, both for safety and for convenience of operating.

This plan has been tried out in part, on the city's system for ten years, and is being used on the present 15,000-volt, two-phase system as the best and cheapest means of relief for overload feeders. There are now seven primary districts in operation, with three more under construction and four more to be added as rapidly as possible. So far, the system has proved satisfactory beyond expectation.

MECHANICAL ANALOGS — III.

BY G. R. SCHUCK

(A comparative summary of the mechanical and electrical relationships analyzed in the article appearing in the last issue is given here in the third paper of the Mechanical Analogs series. The author is a member of the electrical engineering department of the University of Washington.—The Editor.)

An examination of Figs. 1 and 3 together with the curves representing pressure, electromotive force, fluid flow and flow of electricity which may be

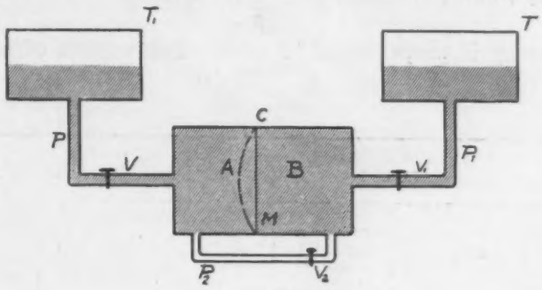


Fig. 1

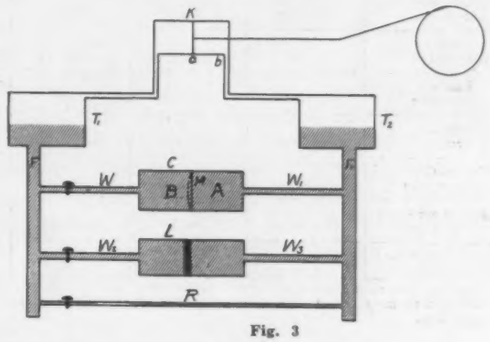


Fig. 3

found in the previous article appearing in the September 1st issue of Journal of Electricity, will lead to the following conclusions.

1. A condenser connected across the mains of an alternating current circuit acts as an absorbing or elastic medium, a charge of electricity being absorbed by the dielectric during one part of the cycle and returned to the circuit during the other part of

The West now purchases $30 worth of electrical appliances per capita as compared with $7 in the rest of the country. Industrial development means general development and an even higher purchasing power.

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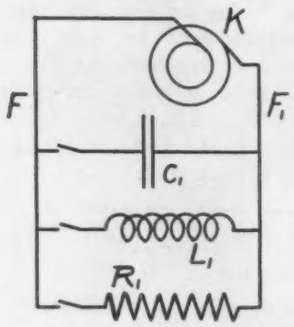
the cycle, as is the membrane M, stretched first in one direction and then in another, causing a flow in and out of the condenser ninety degrees or a quarter period in advance of the electromotive force, or in other words, ninety degrees out of phase with the electromotive force. The maximum potential energy stored up in the stretched membrane M is proportional to the product of the average force exerted on the membrane from the time it is in its maximum state of stress until it is in its neutral position, and the volume or quantity of fluid displaced. Potential energy is proportional to $\frac{E\,q}{2}$. The volume of displacement is proportional to the product of the pressure E and the capability K of the membrane to be stretched under unit pressure. Therefore potential energy is proportional to $1/2\ KE^2$. Also the maximum electrostatic energy stored in a condenser equals $1/2\ CE^2$.



This diagram illustrates the electric principles shown in the mechanical analog in Figure 3. The maximum electromagnetic energy in this inductive circuit is ½ L_1^2.

2. An inductance coil connected across alternating current mains acts in the nature of inertia of mass. This inertia tends to oppose any change of current and retards the current ninety degrees or a quarter period behind the electromotive force, or in other words the current lags ninety degrees out of phase with the electromotive force. The coefficient of self induction L, which is a measure of a circuit's ability to induce counter electric motive force or self induction, takes the same part in electrical phenomena as do masses such as M in mechanical mechanisms. The maximum kinetic energy of the mass D in Fig. 3 is $1/2\ MV^2$. The maximum electromagnetic energy in the inductive circuit of Fig. 5 is $1/2\ L1^2$.

3. A non-inductive resistance connected across the alternating current mains acts in the nature of mechanical friction having no retarding or absorbing properties. The curve of current is practically the same shape as the curve of the electromotive force, and exactly coincides in time relation with it; in other words, the current is in phase with the voltage and the power factor is unity.

TABLE I—QUALITIES OF REFLECTORS OF DIFFERENT FORMS

Qualities	Metal, porcelain-enameled			Glass	
	Shallow-bowl or dome, 15 degree cut-off angle	Deep-bowl	Shallow-bowl lamp fitted with shield or cap	Deep-bowl mirrored glass	Deep-bowl prismatic glass
Horizontal illumination	Excellent	Fair	Fair	Excellent	Excellent
Vertical illumination	Good	Poor	Poor	Fair	Excellent
Ease of maintenance	Excellent	Excellent	Fair	Fair	Fair
Non-liability to breakage	Excellent	Excellent	Excellent	Fair	Good
Non-liability to deterioration	Excellent	Excellent	Good	Fair	Excellent
Avoidance of eye strain from direct glare	(See Note)	Good	Excellent	Good	Good
Avoidance of glare from polished surfaces	(See Note)	Poor	Excellent	Poor	Poor

Note—The glare from clear lamps is greater with shallow-bowl or dome reflectors than with other types. To prevent excessive glare the lamps should either be frosted or be equipped with opal glass caps, unless mounted at least 20 feet above the floor.

TABLE II—SIZE OF LAMPS AND SPACING REQUIRED FOR VARIOUS INTENSITIES OF ILLUMINATION

The intensities recommended for various operations are given in the text.
L = Lamp size in watts; S = Spacing in feet. (These values do not apply to indirect lighting.)

Foot Candles	Vacuum Tungsten	Gas filled tungsten											
	L S	L S	L S	L S	L S	L S	L S	L S	L S	L S	L S	L S	L S
¼	50—28	75—39	100—48	150—61	200—72								
½	50—20	75—28	100—34	150—43	200—52	300—66							
1	50—14	75—19	100—24	150—31	200—36	300—47		400—55		500—63			
2	50—10	75—14	100—17	150—22	200—26	300—33		400—39		500—45		750—56	1000—61
3	50— 8	75—11	100—14	150—18	200—21	300—27		400—32		500—36		750—46	1000—54
4		75—10	100—12	150—15	200—18	300—24		400—28		500—32		750—40	1000—47
5			100—11	150—14	200—16	300—21		400—25		500—28		750—36	1000—42
6			100—10	150—12½	200—15	300—19		400—23		500—26		750—33	1000—38
8				150—11	200—13	300—17		400—20		500—22		750—28	1000—33
10					200—11	300—15		400—18		500—20		750—25	1000—30
12						300—13½		400—16		500—18		750—23	1000—27
15						300—12		400—14		500—16		750—20	1000—24

ILLUMINATION BY DIRECT LIGHTING

The accompanying table taken from the Electric Journal will prove useful to contractors who are doing wiring jobs on industrial plants. The distance apart that the lamps are spaced depends upon the character of illumination required.

DESIRABLE SPACING

Ceiling Height	Fine Work	Rough Work
10 feet	8 to 10 feet	10 to 12½ feet
12 feet	11 to 14 feet	14 to 17 feet
14 feet	13 to 17 feet	17 to 21 feet
16 feet	16 to 20 feet	20 to 25 feet
20 feet	21 to 26 feet	26 to 33 feet
25 feet	27 to 35 feet	35 to 43 feet
32 feet	35 to 45 feet	45 to 56 feet

The following recommendations for intensities in different industries are given only as a guide, as each industry has its own requirements that must be met.

Character of Work	Intensity in Foot Candles
Ordinary Metal or Woodworking Shop, Tool Making, Pattern Making and Light Colored Textile Work	4
	8
Foundry Work	4-6

View across the city of Spokane, from the top of the Davenport Hotel where the convention was held. Near the center of the picture can be seen the famous Monroe Street bridge built over the falls in the center of the city with the Washington Water Power Company's power house below.

The Spokane Convention

(Another page of electrical history has been written by the Northwest Electric Light and Power Association at its Spokane Convention September 8th to 11th. Its adoption of the plan for a cooperative electrical league is one of the most significant events of the year, and together with the other features outlined below, has made the convention one long to be remembered.—The Editor.)

One hundred and sixty members and guests reported in the initial registration of the Thirteenth Annual Convention of the Northwest Electric Light and Power Association.

A note of optimism on public utility prospects for the coming year was sounded by President Fisken in his opening address, together with an appeal for united action in facing problems which still remain. Among bettering conditions he placed the labor situation, fair allowance of rates, and public interest in utility financing and municipal ownership situation. Much remains to be done in lessening the burden of taxation, and in making provision, in rate fixing, for the fluctuating dollar. The tendency of municipalities to take over regulation from state utility commissions, said President Fisken, should be met by a firm stand.

Adjustment of local interests to National Association needs is still going on, and a new constitution for the Northwest Section is at present under discussion. An eleven-fold program was outlined by the Commercial Committee, R. W. Clark of Puget Sound Power & Light Company, chairman, as follows:

1. Cost data on competitive versus other service.
2. Successful efficiency methods in all departments.
3. Methods found practical in securing rate increases.
4. Elimination of gratuitous service.
5. Educational campaigns.
6. Customer ownership campaigns.
7. Increase of demand.
8. Policy on special transformers for special devices.
9. Demarkation between transmission and distribution, with what voltage to rural districts.
10. Rates to new and old customers.
11. Classification of costs into main divisions of service.

George L. Myers of the Pacific Power & Light Company, for the Oregon Publicity Committee, presented plans for the formation of a representative power company committee on public relations in Oregon. The need for uniform interpretation of accounting clauses relative to deferred maintenance was brought out in discussions of the Accounting Section report. W. R. Putnam, manager of the Idaho Power Company, reported on the proposed joint meeting of power companies and commissions to straighten out publications between states. A joint luncheon meeting of convention and advertising men was addressed by Robert Sibley, editor of the Journal of Electricity, on the self-interest idea.

The Northwest Electrical Service League

The most important work before the convention, however, was undoubtedly the adoption of the plan for the Northwest Electric Service League. This was presented by R. W. Clark, Puget Sound Power & Light Company, chairman of the committee, and ably seconded by A. C. McMicken, Portland Railway Light & Power Company, and J. V. Strange, Pacific Power & Light Company. J. R. Tomlinson, of the Pierce Tomlinson Electric Company, Portland, Ray C. Kenney, of NePage McKenny Company, and W. M. Meacham of Meacham and Babcock, presented the support of the contractor-dealers, and J. I. Colwell, Western Electric Company, Seattle, spoke for the jobbers. The report of the committee is in part as follows:

Your Advisory Committee recommends that a permanent organization for the cooperation of elec-

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The passage of the water power bill makes possible the development of the water power to meet the needs of industrial growth.

FORWARD WESTERN INDUSTRY!

trical interests in the Northwest be formed to be known as the Northwest Electrical Service League.

Purpose —

The aim of this Service League is to promote the growth of the electrical industry in all its branches through the coordination of effort in the rendering of better electrical service to the public, based upon the conviction that more efficient electrical service as a whole to the public will elevate our industry to a plane that its merit and usefulness deserve.

Its activities shall be directed along constructive lines within the industry in the way of encouraging sound, ethical and progressive business methods that will result in a fair and reasonable profit based upon service rendered to the public.

Its activities shall also be directed along educational lines without the industry, legitimately to increase the use of electricity and electrical equipment by the general public to the mutual interest of all branches of the electrical business.

Management —

Your Committee considers as essential to the success of this movement that a permanent Advisory Committee be created representing the active branches of the electrical industry in the states of Oregon, Washington, Idaho, Montana and Utah, the personnel to be drawn on some proper basis from central stations, contractor-dealers, jobbers and manufacturers. This committee should direct the activities of the League, the immediate direction, of course, to be in the hands of a management committee drawn from the advisory group in accordance with the extension of this work in the respective states (which will be referred to later), the service of the Advisory Committee to be rendered without compensation.

Organization —

Your Committee recommends that a working organization be employed consisting of a manager-secretary and an office assistant to the manager-secretary, also two field representatives.

The duties of the manager-secretary are as follows:

1. Attend all meetings of the Advisory Committee and make proper record of its proceedings.
2. Assist the Chairman in the supervision of the work and the details of the Service League.
3. Analyze the weekly reports and work of the field men and submit to the Advisory Committee a digest of same for its information and consideration.
4. Supplement the work of the field men with follow-up letters.
5. Prepare bulletins of an educational nature on the principles, practices and methods of successful retail merchandising.
6. Prepare and send to all contributors monthly reports of the progress of the Service League.
7. Prepare from time to time for the electrical press and newspapers articles concerning the League's activities.
8. And address meetings of electrical organizations, architects, home builders, improvement clubs, etc., on the various phases of the electrical business and its development.

Under the direction of the manager-secretary the field representatives are to visit and work throughout the district with contractor-dealers, power company managers and employes, making reports at frequent intervals direct to headquarters.

In general their duties are as follows:

1. When practical, arrange joint meetings of all electrical men in each city visited for a discussion of their common interests and problems.
2. Call upon and urge power company managers and employes to cooperate closely with contractors and dealers and their associations and promote a better acquaintance between power company employes and contractor-dealers, that each may better understand the problems and functions of the other.
3. Attend when possible local or sectional meetings of electrical contractors and dealers in their territories as often as time permits, taking an active part in these meetings and stimulating interest in the League's activities.
4. Call upon and assist both electrical contractors and dealers, explaining good merchandising principles and practices, and pointing out in each case means and ways of improving the individual business, emphasizing especially:
   (a) The necessity of giving service to the public, explaining the elements and practices that go to make good service.
   (b) The work of the League and the actual results achieved by electrical contractors and dealers who have followed recommendations.
   (c) The necessity of electrical contractors and dealers cooperating with each other, explaining how each branch of the electrical contractor-dealer business depends upon the other for success
   (d) The advantages of membership in the State Associations and the National Association of Electrical Contractors and Dealers and of organizing sections in which local problems can be discussed at weekly meetings.
   (e) The importance of cooperation and personal acquaintance with power company managers and employes and the necessity of giving prompt attention to the work referred to them by the power company.
   (f) The sphere of advertising in expanding the business and in building up good will for both the electrical contractors and dealers.
   (g) The importance of correct accounting, both to the electrical contractor and the dealer, promoting the use of the complete or simplified standard accounting system as each individual case may require.
   (h) The necessity of having all owners, architects and home builders provide sufficient outlets for present and future use of electrical appliances.
   (i) The value to the electrical contractor of a definite place of business and to the electrical dealer of an ideal retail location.
   (j) The benefits to be gained by the electrical contractors by the use of high quality material and workmanship and standard estimating forms.
   (k) The necessity of each individual electrical contractor itemizing all items of overhead expense and determining a fair average percentage for his overhead charges.
   (l) The proper arrangement of electrical stores and the correct presentation by the dealer of his merchandise to the public through floor and window displays (to assist in which work the field men will take and show to the dealers photographs of satisfactory arrangements and displays).
   (m) Cooperation with the Industrial Accident Commission and the necessity for rigid compliance with orders issued by the Commission.
5. Establish personal contact with architects and builders and attend their meetings.
   (a) Call to the attention of architects and builders the service that can be rendered their clients by providing their homes, offices and other buildings with complete electrical service, adequate wiring and sufficient outlets for present and future use of electrical appliances.
   (b) Encourage the electrical contractors to cooperate with the architects and home builders.
   (c) Discuss and endeavor to correct grievances that any architect or builder may have with any particular contractor or other member of the electrical industry.
   (d) Point out to all electrical contractors and dealers with whom they come in contact that it is their duty to the industry to spread the propaganda of adequate wiring and sufficient outlets for present and future use.

The schedule of duties as outlined above has been taken with slight modifications, from the last annual report of the California plan, and is obviously the result of their several years of practical experience.

The general impression of the Advisory Committee, based upon observation and reports, is that conditions at this writing are such that it would perhaps be more advisable to project this plan for the immediate future in the two states offering the most favorable conditions for satisfactory results, namely, Oregon and Washington, with a tentative plan for expansion into the other states of the district at an appropriate time when the circumstances warrant and the electrical trade therein would be benefited to a sufficient degree.

An analysis, however, of this idea by the Committee discloses sufficient merit to justify the hope that such a plan will in the course of time find its activities producing wholesome results in the entire five states of this geographic section.

Financing —

As a result of a survey of the work to be carried on, your Advisory Committee has determined that a budget of $25,000 should be provided for the first year's work of the League in Oregon and Washington. As a method of procedure in the raising of this fund, the Committee offers the suggestion that the following percentages would be equitable for division by the interests participating:

Contractor-Dealers	12%
Jobbers	23%
Manufacturers	30%
Central Stations	35%

Conclusion —

Based upon the instructions accompanying the assignment of this Committee, we have approached the subject from the viewpoint that there is a growing feeling in the Northwest that it would be advantageous to have a program that would coordinate in an efficient way the efforts of all the electrical interests in this great Northwest, and have endeavored to work out in an impersonal way the above plan.

It is the belief of the Committee that the creation and building up, along sound lines, of such an institution as this over a period of years will provide a vehicle by which it will be possible to add many millions of dollars to the gross income of the electrical interests of the district in excess of that which will accrue over a substantial period with the apparent unrelated efforts of the various interests that now exist.

Evidence in abundance exists of tangible results from coordinated effort along this line not only in the electrical business but in other industries, and it does not require a

great stretch of vision for any conscientious individual in any branch of our business to forecast the possibilities not only of improvement but of something more nearly approaching the saturation point in the electrical business by having machinery through which all individual and collective electrical interests can find a common point of interest.

ADVISORY COMMITTEE ON THE CO-OPERATION OF ELECTRICAL INTERESTS

F. N. Averill, Fobes Supply Co., Portland, Ore.; L. A. Lewis, Washington Water Power Co., Spokane, Wash.; W. R. Putnam, Idaho Power Co., Boise, Idaho; R. F. Bailey, Utah Power & Light Co., Salt Lake City, Utah; J. Ryan Gaul, Montana Power Co., Butte, Montana; J. F. NePage, NePage McKenny, Portland, Ore.; W. M. Meacham, Meacham & Babcock, Seattle, Wash.; J. I. Colwell, Western Electric Co., Seattle, Wash.; R. T. Stafford, Allis-Chalmers Mfg. Co., Seattle, Wash.; J. R. Tomlinson, Pierce-Tomlinson Electric Co., Portland, Ore.; Roy C. Kenney, NePage McKenny, Portland, Ore.; A. C. McMicken, Portland Railway Light & Power Co., Portland, Ore.; J. V. Strange, Pacific Power & Light Co., Portland, Ore.; C. B. Hawley, Intermountain Electric Co., Salt Lake City, Utah; Hugh Bargion, Montana Electric Co., Butte, Mont.; W. D. McDonald, Westinghouse Electric & Manufacturing Co., Seattle, Wash.; A. S. Moody, General Electric Co., Portland, Ore.; R. W. Clark, chairman, Puget Sound Power & Light Co., Seattle, Wash.

The story of the California Electrical Cooperative Campaign was presented by D. E. Harris, Pacific States Electric Company, San Francisco, Clotilde Grunsky, associate editor of the Journal of Electricity, and Robert Sibley. There were expressions of enthusiastic support from all branches of the industry. The report was unanimously adopted and recommended to the executive committee for the formation of a campaign in Oregon and Washington, with other states to follow.

Papers and Discussions

As the first item on the second day's program W. M. Leavitt, secretary of the Western Cedar Association, presented a paper on pole treatment, outlining a puncturing process which gives maximum saturation and results. Technical reports were presented by George E. Quinan, chief electrical engineer with the Puget Sound Power & Light Company, and comprised a broad survey of Northwest problems. In the discussion of the meter report the importance of the education of meter readers was emphasized as well as the necessity for commercial and accounting men appreciating accuracy of meters. Of one hundred thousand tested, ninety-five per cent were found accurate and four per cent favored the public.

An appeal was made by H. J. Gille, sales manager with the Puget Sound Power & Light Company, for a study of power-factor recording apparatus to meet the growing Western problem. In presenting the apparatus report, F. D. Nims of Everett, Wash., urged the special responsibility of the West for hydroelectric research. The necessity for the study of oil switches was brought out by S. C. Lindsay, engineer with the Puget Sound Power and Light Company, who said that the Western plants were growing beyond the capacity of those now manufactured.

George E. Quinan presented the report on inductive interference, a problem which is of primary importance as shown by the many appeals for assistance in law cases. Fundamental principles have been tentatively adopted and a program outlined. The cooperation of communication interests was promised by D. I. Cone, engineer with the Pacific Telephone & Telegraph Company, who spoke for the telephone company. There was a general feeling that a good beginning has been made toward allaying the interference situation.

The Thursday evening open meeting was addressed by Dr. W. J. Hindley on the Future of the Northwest, and by Robert Sibley on the Status of the Electrical Industry in the West.

On Friday William M. Hamilton of the Portland Railway Light & Power Company delivered an address on Public Utility Management of the Future, in place of Franklin T. Griffith, emphasizing the importance of the question of national work, particularly the question of having the same public policy program throughout the country.

Important problems of overhead construction were presented at the Friday session, with a constructive program for the coming year. In addition, problems of underground construction and electrolysis were discussed.

The report of the committee on safety rules showed that a better understanding of Northwest problems by the Bureau of Standards as well as by Eastern utilities had resulted from this work.

A review of the range and water heater report also brought out active discussion. A more detailed treatment of the many interesting papers presented will appear in the next issue of the Journal of Electricity.

Entertainment

The importance of the business transacted at the convention by no means obscured the social side of the gathering. Numerous delightful entertainment features had been planned, especially for the ladies, and on Saturday at the close of the business sessions the delegates and their friends adjourned in a body to Hayden Lake for golf and other sports.

New President Elected

Franklin T. Griffith, president of the Portland Railway Light & Power Company and a vice-president of the National Electric Light Association, is the newly elected president of the Northwest Electric Light and Power Association, succeeding John B. Fisken. Mr. Griffith was this year re-appointed to the chairmanship of the Water Power Committee of the National Electric Light Association, his fine work in this connection having been one of the features of the organization's accomplishments last year. The confidence which this re-appointment signified is echoed in Mr. Griffith's election to the presidency of the Northwest Geographic Section. The Association is to be congratulated on its choice, and on the active and successful year which Mr. Griffith's leadership assures.

The West is growing at a rapid rate both in population and in the development of its natural resources. Industrial development should keep pace.

FORWARD WESTERN INDUSTRY!

SPARKS—Current Facts, Figures and Fancy

(Fish stories from the island of Guam, an Irish reason for wireless telegraphy, the cost of a good thunderstorm and also of a cup of coffee, together with sundry other items of more than passing interest gathered together from all over the world, are here presented for the amusement and instruction of the curious reader.—The Editor.)

Under a rent restriction act in England a landlord is prohibited from increasing the rent more than 10 per cent.

* * *

The largest oil well in the world is located in Mexico and is known as the Cerro Azril No. 7. It is yielding 270,000 barrels of oil every twenty-four hours.

* * *

It has been estimated by a European scientist that the commercial value of the electricity in a flash of lightning lasting one-thousandth of a second is 29 cents. Now we know what the newspaper headlines mean when they say, "25,000 Storm Hits Middle West."

* * *

Of course, North America would like very much to rank first among the continents of the earth in the height of mountains, but these certain articles are rather difficult to extend. Nevertheless we are only third upon the list. Asia has Mount Everest, which stands 29,002 feet above sea level, and South America has Mount Aconcagua of the Andean system, which is 23,080 feet high. North America comes next with Mount McKinley, in Alaska, 20,300 feet above sea level.

* * *

Farmers of the Philippines are to learn how to work at the movies. The Department of Agriculture and Natural Resources of those islands plans to arouse a true appreciation of the possibilities of agricultural machinery by presenting the most approved methods of cultivation, preparation of seed, use of farm machinery and other phases of farming on the movie screen. Considerable success has already been experienced in advertising machine stripping rather than salt water retting in the preparation of maguey fiber for the market.

* * *

Electrification advances in Japan. According to the provisions of a bill recently introduced in the Diet for the complete electrification of the railways of Japan, the government would invest 50,000,000 yen in a semi-governmental electric power company, which would be capitalized at 100,000,000 yen. While the company would generate power primarily for the Railway Department, any surplus of current would be disposed of to private concerns. It is further understood that the government contemplates erecting the largest hydroelectric plant in Japan on the River Shinanogawa near Tokyo, which would probably be supplemented by a large steam plant, also near Tokyo.

How much do you think our morning cup of coffee costs? The most recent figures on this subject show that at the present time the American people are paying over a million dollars a day for this most popular of all popular beverages.

* * *

It seems there are ways and ways of catching fish. For instance, in Guam they lower the fruit of a native tree into the water. During the night this stupefies the fish that come near and brings them to the surface where they are easily caught.

* * *

It won't be long until they're all typing in China. The new Chinese language adopted in 1918 has greatly simplified Chinese lettering, making it possible to print with the typewriter. And now reports come that American manufacturers are seriously taking up the production of Chinese typewriters.

* * *

We might say that trouble is the mother of progress since the frequent cutting of telephone and telegraph wires in Ireland is forcing the installation of an extensive system of wireless telephony. Naval signal men are being employed to start the system, and it is reported that portable telephones with a radius of about thirty miles are being employed in transmitting messages from one police station to another, or between adjacent towns.

* * *

California ranks fifth among the states of the Union, based on a recently compiled comparison of resources of state banks. This is a statement of the condition of all banks under state control, furnished by the heads of the state bank departments. New York, of course, leads the nation with resources, $7,298,000,000; Massachusetts comes next, with $2,096,000,000; Illinois, fourth, with $1,819,000,000; California, fifth, with $1,347,000,000. The only other state in the billion class is Michigan, with $1,057,000,000.

* * *

The national debts of the world now approximate $265,000,000,000 against $44,000,000,000 at the beginning of the great European war. The interest charges on the grand total now exceed $9,000,000,000 per annum, as against about $1,750,000,000 in the year before the war. The per capita of national indebtedness averages, for the aggregate population of all the countries for which debt figures are available, about $150 per capita, against approximately $27 per capita in 1913, and annual interest charges about $6 per capita at the present time, as against about $1 per capita in 1913.

PERSONALS

Oscar C. Merrill has been appointed by Secretary of War Baker to the position of executive secretary of the Federal Power Commission. Mr. Merrill, who was formerly chief engineer of the United States Forest Service and had been connected with that service since 1909, is well known on the Pacific Coast as a water power specialist. Mr. Merrill graduated from the Massachusetts Institute of Technology in 1905 and spent his first year out of college at the University of California as an instructor in the college of engineering. He then became associated with Charles G. Hyde and began his specialization in water-power consulting work by investigating the adaptability of power sites along the line of the Southern Pacific in Oregon and Washington. Later Mr. Merrill made a valuation of the system of the California-Oregon Power Company with Mr. Hyde. In 1909 Mr. Merrill entered the Forest Service and started a survey of the water-power sites of California and in 1910 was made district engineer with headquarters in San Francisco. He was soon placed in charge of all water powers coming under the jurisdiction of the Forest Service and in 1914 was ordered to Washington to become chief engineer of the Forest Service. From his intimate connection with the undeveloped water-power of the West through the Forest Service Mr. Merrill is perhaps better fitted for the position of executive secretary of the Federal Water Power Commission than any other man in the government service. The appointment of Mr. Merrill assures the people of the West that their interests will be looked after by a man who has studied conditions in this part of the country, and who can appreciate what it means to the West to have a law which will allow the development of its greatest natural resource.

W. E. Robertson, of the Robertson Cataract Co., Buffalo, New York, is looking after new business and enjoying a vacation in the Puget Sound district. He arrived in Seattle September 3.

Charles E. Taber, chief clerk for the Southern California Edison Company in Redondo district, has gone to Tampico, Mexico, where he has a position with the International Petroleum Company.

George T. Bradley, superintendent of the Western Colorado Power Company in Telluride, Colorado, has resigned to take a position with the Holly Sugar Company at Delta. He will be succeeded by Harry J. Johnson.

R. T. Stafford, manager of the Seattle offices of the Allis-Chalmers Company, recently enjoyed a four-day vacation in British Columbia, starting Sept. 3 and ending Sept. 7. A major portion of the time was spent in Vancouver.

Carl M. Heintz, of the Los Angeles office of the Westinghouse Electric & Manufacturing Company, has been appointed chairman of the publicity committee which will handle the two Electrical Homes soon to be opened in the southern city.

A. B. Wollaber, district manager for the Southern California Edison Company in Pasadena, is making an extensive trip through the Northwest, where he also attended the convention of the Northwest Section of the National Electric Light Association.

W. S. Berry, of San Francisco, sales manager of the Western Electric Company, arrived in Seattle on Sept. 12. He expects to spend a few weeks in the Northwest enjoying a well-earned vacation and at the same time, looking after certain business matters.

D. W. Proebstel, operating instructor in the Portland Railway Light & Power Company, Portland, Ore., is making an extensive trip through California and will visit a number of the important electric plants in and about Los Angeles and the San Francisco bay region.

F. R. Whittlesey, formerly in the commercial department of the Portland Railway Light & Power Company, Portland, Ore., has been appointed secretary of the Oregon Association of Electrical Contractors and Dealers at Portland, to succeed J. P. Mundt, who has resigned.

Roy Worth, sales manager of the Pacific States Electric Company, Seattle, and **R. H. Husbands**, in charge of the transmission department of the same company, represented the Pacific States Electric Company at the Spokane convention of the Northwest Electric Light & Power Association.

Howard W. Angus, secretary of the California Cooperative Campaign, has been in Los Angeles for the past two weeks. Captain Angus has been looking after the interests of the campaign in Southern California, particularly the opening of the Los Angeles Electrical Home and the proposed industrial lighting exhibit.

D. E. Harris, vice-president and general manager of the Pacific States Electric Company, San Francisco, accompanied by Mrs. Harris, is spending three weeks in the Northwest. The time will be equally divided between Spokane—including attendance at the convention of the Northwest Electric Light & Power Association,—Seattle, and Portland.

H. A. Barre, electrical and mechanical engineer of the Southern California Edison Company, has been promoted to the position of executive engineer with that company. Mr. Barre is a graduate of the University of California from the college of electrical engineering and since graduating with the class of 1897 has had wide experience in the electrical industry in various parts of the United States. Mr. Barre first went to work with the Southern California Edison Company in 1901 when he was an operator at their Mill Creek No. 1 plant. In 1906 he went with the Electric Bond and Share Company as associate chief engineer and during this time did a great deal of work in the operation and valuation of the seventeen companies that were under the control of the Electric Bond and Share Company. In 1908 Mr. Barre went to Arizona with R. S. Masson and formed the Electric Construction Company, building a power house on Fossil Creek with a head of sixteen hundred feet. In 1911 Mr. Barre went to work for the Pacific Power & Light Company which has since become a subsidiary of the Southern California Edison Company. Mr. Barre is well known for his work in building high tension long distance transmission lines, the 150,000-volt line of the Southern California Edison Company, extending 240 miles from Big Creek to Los Angeles, being one of his latest accomplishments.

The regulating commissions of the West favor the development of this district and make possible the power development to meet Western needs.

FORWARD WESTERN INDUSTRY!

C. T. Baldwin, trade and markets editor on the staff of Electrical World, is at present spending some months on the Pacific Coast in order to become better acquainted with the electrical industry in this region. Mr. Baldwin, who is a graduate in electrical engineering from Princeton University with the class of 1912, was with The United Electric Light & Power Company of New York City until 1917, when he entered the service, from which he was discharged as captain of infantry. Since 1919 he has been with the McGraw-Hill Company in New York, handling the trade editorial work of Electrical World. During his stay in the West Mr. Baldwin will work in cooperation with the Journal of Electricity, and will keep closely in touch with electrical activities on this coast.

Milton Kraemer, consulting combustion engineer, has returned to his San Francisco offices after an absence of several weeks in New York City.

Lloyd Henly, engineer, San Joaquin Light & Power Corporation, was in San Francisco recently to attend a meeting of the Committee on Overhead Line Construction.

E. B. Bumsted, a consulting electrical engineer of San Francisco, has returned to his San Francisco offices after an absence for some weeks past in Kansas City and other middle western cities.

J. B. Fullerton, western district manager of the Apex Electrical Distributing Company, is making a trip over his district for the purpose of getting in closer cooperation with the various agencies.

R. V. Reppy, general counsel for the Southern California Edison Company, has returned to Los Angeles from a trip to Washington, D. C., where he attended the conference of the Federal Water Power Commission.

R. E. Cunningham, superintendent of distribution for the Southern California Edison Company, Los Angeles, was in San Francisco recently to attend a committee meeting of the Committee on Overhead Line Construction.

Frederick W. Gay of The William Cramp and Sons' Ship and Engine Building Company, I. P. Morris Department, Philadelphia, is a recent San Francisco visitor. Mr. Gay was formerly located in San Francisco with J. G. White and Company.

Bruce Lloyd, who had charge of concrete ship construction in the West during the war period, has returned to San Francisco after a five months' visit to his old home in New Zealand. Mr. Lloyd is considered an authority on Diesel engine installation aboard ships.

Donald I. Cone, protection engineer for the Pacific Telephone & Telegraph Company, after an absence in the Northwestern states of several weeks' duration in which he has been investigating certain phases of inductive interference, has returned to his San Francisco office.

Wesley G. Carr, head of the patent department, Westinghouse Electric & Manufacturing Company of New York, and **Victor S. Beam,** legal department of the same company, New York, are in San Francisco at the present time looking after the legal interests of their company.

K. Kita, electrical engineer, Bureau of Electrical Exploitation, Ministry of Communications, Tokyo, Japan, is a visitor in this country as a representative of the government of Japan for the purpose of studying methods of rate fixing, particularly in the case of utilities for the distribution of electrical energy.

Robert Sibley, editor of the Journal of Electricity, and **Clotilde Grunsky,** associate editor, were in attendance at the recent convention of the Northwest Electric Light & Power Association at Spokane. Mr. Sibley gave the address of the convention held jointly with the Spokane Business Association Wednesday noon, September 8, 1920.

C. V. Foulds, chief field engineer of the Pelton Water Wheel Company, and his wife have left for Bombay, India, where he is to be with the Andhra Valley Power Supply Co., Ltd., in the installation of six 15,000-hp. single overhung impulse Pelton turbines. Mr. Foulds expects to be in India for the next year and a half.

Albert Casper, Vallejo Electric Light & Power Company, Vallejo, California, has recently left for a trip to the Northwest to inspect the recent installations of electric ranges in that territory. Mr. Casper has installed a large number of ranges in and around Vallejo and this trip to the Northwest is being made with the idea of finding the latest methods in use there.

L. S. Ready, of the California Railroad Commission, has been appointed chairman of the committee of the San Francisco Section of the American Institute of Electrical Engineers to look into the matter of increasing the service of the Section to its members during the coming year. On this committee are J. P. Jollyman, W. G. Benson, Robert Sibley and C. A. Turner.

W. G. Tanner, of the Los Angeles business office of the Southern California Edison Company, received second prize in the contest just closed for a new name for the National Electric Light Association Bulletin, his suggestion being "The Kilowatt." Mr. Tanner submitted a sketch of a figure called Mr. Kilowatt which will be adopted by the association as an emblem. First prize was awarded to Robert E. Lee of Brooklyn, whose suggestion was "National Electric Progress."

Alexis Germeau and **Franz Dupont,** electrical construction engineers of Charleroi, Belgium, and **Maurice Henriod,** engineer of the export department of the Ohio Brass Company, Paris, France, are making a tour of the Pacific Coast states. These engineers have been inspecting the high tension transmission lines of the West and the methods used in railway electrification. The party came over the Chicago, Milwaukee & St. Paul Railroad to Seattle and from there down the Pacific Coast to Los Angeles, from which point they will return East by way of Denver.

R. H. Ballard, vice-president and general manager of the Southern California Edison Company, **George A. Campbell,** general manager Truckee General Electric Company, **S. M. Kennedy,** vice-president Southern California Edison Company, **Glenn D. Smith,** general manager of the Ontario Power Company, **A. B. West,** vice-president and general manager of the Southern Sierras Power Company, and **A. Emory Wishon,** assistant general manager of the San Joaquin Light & Power Corporation, were recently in San Francisco attending the meeting of the Public Relations Committee, Pacific Coast Geographic Division of the National Electric Light Association.

Henry G. Symonds, Westinghouse Electric & Manufacturing Company, Chicago, has been awarded one of the war memorial scholarships of that company. These scholarships were established in 1919 by the Westinghouse Company as a means of perpetuating the memory of those employes of the company who took part in the Great War. Each scholarship carries with it the annual payment of $500 for a period not to exceed four years and this payment is to be applied toward an engineering education in a technical school or college selected by the candidate and approved by the scholarship committee. Mr. Symonds has selected Leland Stanford Junior University, Palo Alto, California, as the place where he will complete his education in electrical engineering.

Meeting Notices for Electrical Men

(With the close of the summer vacation period electrical organizations are starting in vigorously on their year's work. Recent reports include elections of officers and important meetings of the Illuminating Engineering Society, the Seattle A. I. E. E. and the Contractor-Dealers' state executive committee.—The Editor.)

Bay Cities Chapter, Illuminating Engineering Society

A special meeting of the Bay Cities Chapter of the Illuminating Engineering Society was held in the rooms of the Engineers' Club in San Francisco, during the recent convention of the National Traffic Officers' Association, in honor of Dr. Clayton H. Sharp. Dr. Sharp is technical director of the Electric Testing Laboratory in New York and was present at the convention to assist in the framing of a suitable headlight law.

At the meeting Dr. Sharp spoke on "Some Accomplishments of the Illuminating Engineering Society" and traced the history of the society from the time of its organization in 1906 until the present time. At the time the society was formed the first tungsten lamps had just appeared and sounded the death knell of the old carbon lamps. This meant more and better illumination, and while at first the illuminating engineers paid attention to obtaining a narrow direct ray of light by means of a reflector, the science has now progressed to such a point that the reflectors are turned upside down.

In speaking of glare Dr. Sharp said that the importance of eliminating this phase of lighting was just beginning to be realized, and that while at first only Holophane glass was known, at the present time there were so many varieties that it was possible to secure good illumination without glare in many different ways. In illuminating engineering the United States has always been far in advance of Europe, according to Dr. Sharp, but England has made great strides since the war and is now doing constructive work.

The question of controlling the headlights on automobiles is one of the most difficult problems that the illuminating engineer has to solve. In the first place, the question is extremely complicated on account of the factors that enter into the case, for one must of necessity have a small, intense light controlled so that it will send a long narrow beam down a dark road without glare and without sending its rays into the path of the oncoming machines. This problem is being solved and the fact that the American Automobile Association had called upon the Illuminating Engineering Society to frame a model law controlling headlights shows that the value of the work done by the society is being recognized outside of the electrical industry.

In closing his address Dr. Sharp told of the problems that must be solved in the lighting of industrial plants. "We have proven," said Dr. Sharp, "that increased lighting in an industrial plant will increase production to such an extent that better lighting is a very profitable investment. The problem now to be solved is to what point illumination shall be raised to be the most efficient."

Timber Preservation Discussed at San Francisco Engineers' Luncheon

The proper use and conservation of timber in the United States was discussed in a very interesting way before the Engineers' Club of San Francisco on September 1 by Dr. Hermann Von Schrenk, consulting timber engineer for several railway lines throughout the country.

Dr. Von Schrenk laid great emphasis upon the need for real engineering thought in the use or non-use of preservatives for cross-ties, transmission poles, piling, etc., and linked up this phase with the practice in European countries, where he has studied the situation closely. There it is realized that even with reforestation recurring periodically, a great amount of thought is devoted to the preserving of the timber in hand. In view of the fact that the accessible timber supply in the United States is not inexhaustible without reforestation, the speaker strongly urged that real attention be paid to conserving timber in every possible way.

Convention of Western States Reclamation Association Outlines Plans

The convention of the Western States Reclamation Association, which was held at Boise, Idaho, August 20 and 21, was marked by constructive work and definite plans toward the securing of interest in reclamation throughout the West, and the passage of satisfactory reclamation legislation at the short session of Congress to be held in December. The Western states were well represented.

The report of the publicity committee provides for communication with the leaders of the political parties, with traffic officials of the transcontinental railroads, for the organization of a speaking campaign through chambers of commerce, Rotary clubs and other organizations, appointment of a permanent political committee of three, and company cooperation with the American Legion, real estate associations and other organizations of national scope.

R. S. Shepherd, of Jocum, Idaho, was appointed permanent chairman of the finance committee, and was authorized to raise $30,000 to carry on the association's work. Judge

BUILDERS OF THE WEST — LXXXV

FREDERICK LAIST

No more potent influence has exerted itself in the West in the upbuilding of industry than the production of copper. Continual and steady research activities examining new and hidden processes of electro-chemical production have ever exerted a wholesome and stirring influence in industry. To Frederick Laist, manager of the great Anaconda smelter of the Anaconda Copper Mining Company, Anaconda, Montana, this issue of the Journal of Electricity is affectionately dedicated in appreciation of his ideals of research in the production of copper, particularly in electro-metallurgical developments, that have been so preeminently helpful in the upbuilding of the industry in the West.

The West has a very high purchasing power—the market for manufactured products is a good one.

FORWARD WESTERN INDUSTRY!

Will R. Ring, former counsel for the Reclamation Service, E. F. Blaine of Seattle, Sims Ely of Arizona, and H. V. Platt, vice-president and general manager of the Oregon Short Line Railroad, were among the speakers. At the close of the meeting the following resolution was adopted:

"**Resolved,** That it is the purpose of the Western States Reclamation Association that at the approaching session of Congress the efforts of this association should be concentrated on securing from Congress, either by direct appropriation or by the extension of the credit of the government, as provided in the Smith-Fletcher bill, ample funds to prosecute the reclamation of lands now unproductive by reason of aridity or excess of moisture within the United States, each reclamation to be carried on and funds expended through extending agents of the government, and that preference in securing homes upon such lands be given to former service men and women of the world war."

Seattle Section, A. I. E. E.

The Seattle Section of the A. I. E. E., according to Willis T. Batcheller, secretary, is rapidly rounding into an organization which is a credit to any city. The membership is steadily climbing. Since the first of 1920, approximately forty new members have been added to the Section's roster.

Considerable interest is being evinced in the programs for the Fall meetings of the Section and this interest is well warranted. At the October meeting, to be held on the 19th, H. J. Gille, general sales manager, Puget Sound Power & Light Company, is scheduled to address the assemblage on "Engineering and Contingencies—15%"; on November 16th, at the third Fall meeting, J. D. Ross, superintendent, Seattle Municipal Lighting Department, will deliver a paper on "An Experimental Demonstration of Radiation," and on December 21st, the last meeting of the quarter, F. G. Simpson, vice-president and general manager, Kilbourne & Clark Manufacturing Company, Seattle, will talk on "Recent Developments in Radio Engineering."

Mr. Simpson, during the period of the war, ranked as a Commander in the U. S. Navy and did notable work in supervising naval communications along the Atlantic Coast. Therefore, what he says on radio matters will be noted with exceptionally keen interest.

Mr. Ross's paper will consist of an experimental demonstration of radiation from Hertzian rays to Gamma rays, with special reference to Maxwell's electromagnetic theory of light and the structure of matter. In connection with his paper, Mr. Ross will present several new experiments.

According to present indications, the Annual Dinner of the Seattle Section of the A. I. E. E., to be held at the Butler Hotel on Sept. 21, will be a notable affair. Arrangements for the program are being made as rapidly as possible and final announcements are expected at an early date. It is believed that practically a complete membership will be in attendance to hear Willis T. Batcheller, secretary of the Seattle Section of the A. I. E. E., make his report on the National Convention held at White Sulphur Springs, West Virginia, June 29 to July 2, inclusive, to which he was a delegate. At the dinner also G. E. Quinan, chief engineer of the Puget Sound Power & Light Company, will report on the Pacific Coast Convention, held in Portland July 21-24, inclusive.

California Association of Contractors and Dealers Meets at San Diego

At the session of the state executive committee, on Aug. 13, letters were read from various power companies on the purchase of power company bonds by contractor-dealers, and authority was given to buy 500 posters in connection with the purchase of these bonds. This is just one more step in getting the confidence of the trade in back of the distributing companies.

The executive committee adopted a recommendation to the members that the state association meetings be held in July, October, January and April, and that these quarterly meetings alternate between northern and southern California, covering a two-day period. The question of the association adopting a standard estimate was considered, but it was left to individual action, inasmuch as opinion indicated that members desired to use forms meeting their own requirements.

Varying time limits extended on payments for washing machines, as well as size of initial payments, were discussed on the fourteenth at the retail session; the general impression left was that time payments should be reduced to six months and that $15.00 was not too large an amount for an initial payment. A committee will report on this at the next executive meeting.

On the same day at the members' meeting it was moved that the state executive committee meet with R. L. Eltringham of the Industrial Accident Commission, on his request, on Sept. 18, at Paso Robles. Merchandising was discussed and Imperial Valley and San Diego members favored the electrical home for their localities.

Montana Contractors and Dealers Meet to Further the Industry

"Promoting the electrical industry in Montana" was the purpose of the convention of the Electrical Contractors and Dealers' Association of Montana, meeting in Great Falls on August 22 and 23. There was no lack of harmony and spirit of cooperation, and a standard of work was adopted and a decision reached to confine its business to the state. From the growth of the organization, it is expected to comprise 95 per cent of electrical contractors and dealers of Montana before the next meeting in Butte in March, 1921.

Trips of inspection were made to large industrial and hydroelectric properties, and special efforts put forward to have the dinners as attractive as possible.

San Francisco Section A. I. E. E. Elects Officers for Coming Year

At a recent meeting of the Executive Committee the officers of the San Francisco Section A. I. E. E. for the year 1920-21 were chosen, as follows: Chairman, J. P. Jollyman, engineer electrical construction, Pacific Gas & Electric Company; vice-chairman, W. B. L'Hommedieu, manager of power division, Westinghouse Electric & Manufacturing Company; chairman, membership committee, J. J. Reed, telephone engineer, Pacific Telephone & Telegraph Company; chairman of the papers committee, W. B. L'Hommedieu, manager of power division, Westinghouse Electric & Manufacturing Company; secretary, Allen G. Jones, General Electric Company, San Francisco.

Wood Preservers and Tie Producers to Meet in San Francisco in January

San Francisco is to be the seat of two conventions of timber men next January. The American Wood Preservers' Association has set the date of Jan. 25, 26 and 27 for their seventeenth annual meeting, after convening with the engineers of Southern California in Los Angeles on the twenty-fourth, and the National Association of Railroad Tie Producers convenes on Jan. 27 and 28 for its third annual meeting.

San Francisco Engineers Hear Talk on Concrete

H. C. Boyden was the speaker after the luncheon at the Engineers' Club in San Francisco on Sept. 8. His topic was "Recent Developments in Concrete," dealing with the molecular formation resulting from the setting of the materials.

BEGINNING

in the October first issue Miss Virginia Fairfax, librarian with the Carnation Milk Products Company, Chicago, will contribute to the Journal of Electricity a series of articles on the handling of

PAMPHLETS AND CLIPPINGS IN THE BUSINESS LIBRARY

HAPPENINGS IN THE INDUSTRY

RESTRICTIONS ON NON-ESSENTIAL LIGHTING ISSUED IN CALIFORNIA

Following rather closely upon the heels of the California Railroad Commission's order No. 113 of Aug. 30, published in these columns of Sept. 1, H. G. Butler, Power Administrator, issued order No. 115 on Aug. 30, curtailing the use of electricity for non-essential purposes. The order was effective at once and will remain in force until Oct. 1. Unless the water situation is relieved before that time, however, it is probable that the order will be extended another month.

Order No. 115, directed to all northern and central California power companies, and to mayors of communities in those areas, reads as follows:

(1) Effective at once until Oct. 1, 1920, except Saturdays and Sundays, no electrical energy shall be furnished or used—

(a) For advertisements, notices, announcements or signs designating the locations of an office or place of business, or the nature of any business.
(b) For external illumination for ornamentation of any building.
(c) For lights in the interior of stores, offices or other places of business when such stores are not open for business.
(d) For excessive street lighting intended for display or advertising purposes.

2. This order shall not be construed to prohibit the furnishing or using of electricity for sign lights as may be required by law or public safety.

"Unless there is the fullest kind of cooperation in our efforts to protect the essential industries of this section of the state," said Mr. Butler in discussing the serious power situation caused by the scanty rainfall of the last three years, "great damage will be done. Growing crops must be protected and the wheels of essential industries must be kept moving. Each user of electricity for sign purposes should realize that the burning of an electric sign is now an advertisement of the fact that he is using electricity which should go to the productive industries of his community. Many are now out of work because of the power shortage. The unemployment is bound to increase if waste continues.

"Public opinion is correct in assuming that this non-essential use of electricity should be restricted in favor of productive enterprises," said Mr. Butler. "In many of the smaller communities of the state, splendid cooperation has been given. The larger cities, apparently, have not had the seriousness of the situation brought home to them. It is now a case of conserve or suffer."

In closing his letter to the mayors Mr. Butler says: "May we have the help and cooperation of your public officials and police force in securing prompt compliance with this order, as we did in 1918 when a similar order was in effect."

General compliance with this order is reported throughout the regions named, although there are some noticeable exceptions. The Retail Drygoods Association of San Francisco, for instance, has proposed full cooperation, and in the windows of many of the large stores the following sign has been placed:

In order to save power for productive industries and growing crops, our electric signs and windows will be kept in darkness in accordance with the order of H. G. Butler, State Power Administrator.

Police in several cities are assisting in enforcing the order on delinquent consumers, and certain power companies announce their intention of cutting off current from those violating the order.

A further order, No. 117, was issued on Sept. 4, part of which follows:

Arrangements have been made between the office of the Power Administrator and representatives of the Irrigation Division of the United States Department of Agriculture and of the College of Agriculture of the University of California, who have consented to assist during the present emergency, by which the power available for agriculture can be handled to better advantage.

As far as possible, agricultural power must be used between the hours of 9 p.m. and 7 a.m.

The order suggests that power companies consult local representatives of the Irrigation Division in regard to the carrying out of the section modifying paragraphs 1 and 2 of Order No. 113, printed on page 243 of the Sept. 1 issue of the Journal of Electricity. This prohibited the use of electricity for irrigating orchards after the crops had been removed. The new order prevents permanent damage to the orchards and at the same time prevents any excessive use of power.

IDAHO POWER COMPANY TO BUILD NEW HIGH TENSION LINE

A new 132,000-volt line from its Thousand Spring plant to Caldwell is now being located by the Idaho Power Company. It is understood that construction work will begin as soon as material arrives, with July, 1921, set as a date of operation. Sixty-foot wood towers will be used. The financing was through the recent sale of $2,000,000 of 8 per cent first and general lien bonds.

COURT ANNULS COMMISSION'S ORDER ON PASADENA TO FILE RATES

California's Supreme Court has recently declared annulled the order of the Railroad Commission of the State of California requiring the city of Pasadena, a municipal corporation, to file a schedule of rates for electric service. It was as the result of an application for certiorari to review the Commission's order that the decision was rendered. The court found "No tenable ground upon which to base the conclusion that the rates charged by a municipality for its service in carrying on any public utility, either within its own limits or in outside territory, are under the control of the Railroad Commission."

The city of Pasadena supplies electric service in the adjoining city of South Pasadena also, and it was on complaint of the Southern California Edison Company, through the Pacific Light & Power Company, which also supplies electric service to the inhabitants of South Pasadena, that the order was issued a year ago.

It is probable that the Railroad Commission will not consider an appeal to higher authorities until after a decision has been rendered by the United States Supreme Court in a similar case now pending, involving the Public Utilities Commission of Illinois.

SAN FRANCISCO MINT INSTALLS ELECTRIC FURNACE

To increase the output of minor coins, the United States Mint at San Francisco is installing a Rennerfelt electric furnace of 1000 pounds capacity, operating on two-phase, 60-cycle service transformed from 2200 volts to 110 volts. The furnace was originally in operation at the Philadelphia (Pa.) Mint, and was only recently withdrawn from service there when replaced by furnaces of more recent design and greater capacity. It is hoped to have the furnace in operation by the end of September, but this may be delayed through uncertain delivery of certain electrical switching equipment.

The labor supply of the West is reasonable and adequate in comparison with other districts.

FORWARD WESTERN INDUSTRY!

Only metal for pennies and nickels will be melted in this furnace, silver being handled in the oil-fired crucibles now in use. Several of these crucibles were taken out to make room for the electric furnace, while considerable construction work was necessary to accommodate the new equipment. A motor-driven topping machine and a motor grinder will be installed to handle the clipping and smoothing of the ingots, and a mechanical conveyor will eliminate most of the heavy carrying of the molds now done manually.

NEW POWER PLANT AT BEND, OREGON

In preparation for the construction of the first unit of the Bend Water, Light & Power Company's plant on the Tumalo River, plans for which are now in the hands of the state engineer, a crew of men was sent out to build the necessary roads and to put up bunk houses for the large force to follow.

Plans for the first unit call for a 300-ft. fall, which it is estimated will cost $100,000 and will develop 2,000 hp. The second unit, which will not be built until demands warrant its construction, will utilize the water going through the first plant, with a fall of 400 ft., in a 12,000-ft. pipe line. This unit will develop 3,000 hp. and will cost approximately $150,000.

WESTERN STATES FILE SIXTEEN APPLICATIONS FOR WATER POWER

Under the new federal water-power act, sixteen applications for preliminary permits or licenses have been reported by the Federal Power Commission at Washington. These preliminary permits are merely for the purpose of maintaining priority of application for license under terms of the act for a period of not exceeding three years, while examination and survey for preparing the necessary maps, specifications, estimates and financial arrangements are under way.

It is interesting to note that of the thirty-eight applications so far made public by the federal commission, sixteen are in the San Francisco district, district No. 5, which comprises the states of Washington, Oregon, California, Nevada, Arizona, Idaho and parts of Montana, Wyoming and Utah. The greater parts of Montana, Wyoming and Utah are in district No. 4, the Denver district, the remainder of which takes in Colorado and parts of New Mexico, Nebraska, South Dakota and North Dakota. In this district there have been no applications made public to date. Of the twenty-two remaining applications, twelve have been filed in New York state, principally along the Niagara and St. Lawrence rivers.

Among the Western states, the greatest activity is indicated in Washington, where six applications have been filed. Idaho has filed four, California three and Oregon, Montana and Arizona one each. The one in the southern part of California is on the Colorado River, which is bounded by Arizona at that point, which is filed also under Arizona.

OBJECTIONS PRESENTED AT CALIFORNIA BOILER CODE HEARINGS

At the public hearings on the tentative revised boiler safety orders for California, which have been held in San Francisco, objections have been raised by those interested in boiler operation to some of the revisions proposed by the committee appointed by the Industrial Accident Commission of California. A further hearing has been scheduled for October 7 in San Francisco, to continue where that of August 19 left off.

For new installations, the commission is at present following the 1914 boiler code of The American Society of Mechanical Engineers, and it proposes to adopt that society's 1918 code to bring matters up to date.

The rub comes principally on the proposed code as applied to existing installations. Objections have been filed on the rules that shall apply to calculating the safe working pressure of staybolted surfaces (378, b) and on factors of safety for lap-riveted construction. It is objected that a factor of safety of 4½ should be set as a minimum and let it apply to a boiler regardless of its age, making it higher if conditions of the boiler called for it. Sec. 380 (a) proposes from 4¼ to 5 for boilers ranging up to 20 years old, where lap-riveting is employed and the shells are exposed to the direct products of combustion. Where the shells are not so exposed, the Commission proposes a factor of from 4 to 5 for the same range and objectors have recommended the same figure of 4½.

A further factor of safety of six is objected to as too high in the case of second-hand stationary lap-seam boilers within the state on October 1, 1920, where both ownership and location have changed (Sec. 381, a). It is expected that other objections will be submitted at the October 7 hearing.

The personnel of the boiler revision committee is quite representative of the interests concerned with boiler operation, and takes its members from gas and electric power stations, electric railways, machinery dealers' associations, lumber associations, insurance companies, oil companies, operating engineers' unions, the Industrial Accident Commission, iron works, merchants and manufacturers' associations, and a board of public works.

SAN JOAQUIN LIGHT & POWER CORPORATION START NEW PLANT

Right on the heels of the starting of the new Kerckhoff power house comes the announcement from the San Joaquin Light & Power Corporation's construction department that ground has been broken for the new natural gas-burning steam plant in Kern county, one mile east of Buttonwillow.

According to General Superintendent E. A. Quinn, of the power company, who has this work in charge, the new plant will be rushed to completion to meet the heavy demand next summer. All machinery for the first unit, consisting of a battery of tubular boilers, a steam turbine and an Allis-

APPLICATIONS FILED FOR WESTERN WATER POWER PERMITS

State	Applicant	Address of Applicant	Location of Project
Arizona	C. A. Heberlein	Prescott, Arizona	Cataract Canyon, Coconino County, Ariz.
California	Pit River Power Co.	San Francisco, Cal.	Pit River, California.
California	R. W. Hawley	833 Market St., San Francisco	Silver Creek and branches, Eldorado County, Cal.
California	Beckman & Linden Corp.		Colorado River in Arizona and California.
Idaho	G. W. Spoerry	Bonners Ferry, Idaho	Moyie Falls on Moyie River, Idaho.
Idaho	Utah Power & Light Co.	Augusta, Me.	Soda Point, Lava, Narrows and Mink power sites on Bear River, Idaho.
Idaho	Idaho Power Co.	Boise, Idaho	Upper Salmon Falls on Snake River, Idaho.
Idaho	Idaho Power Co.	Boise, Idaho	Twin Falls on Snake River, Idaho.
Montana	Rocky Mountain Power Co.	Butte, Mont.	Flathead River below outlet of Flathead Lake.
Oregon	Crown Willamette Paper Co.	Pittock Block, Portland, Ore.	Falls of Willamette River, West Linn, Ore.
Washington	Washington Irrigation & Development Co.	905 White Bldg., Seattle	Priest Rapids, Columbia River, Wash.
Washington	Alex. Polson	Montesano, Wash.	Headwaters of Wynooche River, Olympic National Forest, and northeastern part of Gray's Harbor, Wash.
Washington	Northwestern Pwr. & Mfg. Co.	Donworth, Todd & Higgins, Hoge Bldg., Seattle	Lake Crescent, Elwha River, Wash.
Washington	Hugh L. Cooper	101 Park Ave., New York	Clark Fork of Columbia River, Wash.
Washington	Sound Power Co.	25 Broad St., New York	Sultan River and Olney Creek, Snohomish County, Wash.
Washington	Straits Power Co.	25 Broad St., New York	Soldue River, Crescent Lake and Lyre River, Clallam County, Wash.

Chalmers generator of 17,500-horsepower capacity, has been ordered from the manufacturers and will begin to arrive as soon as the steel and concrete power house building is completed, which is scheduled for December 15. It is expected that this new plant will be in operation by next April.

To Occupy 120 Acres —

The site for the new gas-burning steam plant is located on the county highway and on the McKittrick branch of the Southern Pacific, 28 miles from Bakersfield, and consists of 120 acres. It will provide ample room for a spur track, a battery of three 18-inch wells 500 feet deep, outdoor transformer stations and other necessary electrical equipment. Comfort conveniences will be provided, notable of which will be an ice plant and a swimming pool 190 by 290 feet.

Largest in the World —

Five units are planned for this plant, which, when completed, will be the largest natural gas-burning steam plant in the world. The gas consumed will measure 7,000,000 cubic feet per day for each unit and will come from the famous Elk Hills gasser, nine miles south, under a well pressure of from 250 to 400 pounds per square inch. The capacity of the gas plant is 50,000,000 cubic feet a day.

Big Saving of Fuel Oil —

Using natural gas instead of fuel oil for steam generating purposes represents a saving of from 1100 to 1200 barrels of oil a day for each unit.

A transmission line of 110,000 volts with a capacity of 30,000 kilowatts will connect with the Kerckhoff power line at the Corcoran substation. Another line will connect with the McKittrick substation from which will be served the West Side oil fields districts of Kern county.

To Cost $5,750,000 —

The cost of the plant will be $1,750,000 for the first unit and $1,250,000 for each additional unit. P. D. Dawson is the designing engineer and C. P. Rhine is resident engineer. J. L. Black is general foreman.

NEW RADIO STATION AT PORTLAND

The Federal Telegraph Company will construct a 100-kw. radio transmitting station of the Poulsen Arc type in the vicinity of Portland in the near future.

This station is being constructed primarily to handle the company's business between Portland and San Francisco, but is of sufficient capacity to be used in trans-Pacific work.

A 620-foot steel antenna tower will be constructed and transmitting power will be supplied by two 100-hp. motor generator sets, driven by synchronous motors.

The station will be erected about 20 miles from the heart of the city, but will be operated by remote control from the company's main office in the Board of Trade Building. The new set will give the company three duplex circuits which will transmit and receive three messages simultaneously.

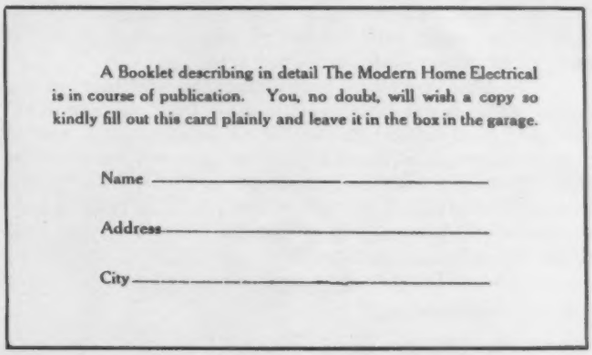
Mr. F. H. Barstow is Portland manager of the Federal Telegraph Company, and will have charge of the operation of the new station.

SOUTHERN CALIFORNIA EDISON BOND ISSUE AUTHORIZED

The Railroad Commission of California on Aug. 30 authorized the Southern California Edison Company to issue on or before Dec. 31, 1920, $438,000 face value of its general and refunding mortgage 6 per cent 25-year gold bonds of the series of 1919. The bonds or the proceeds are to be used to pay or refund bonds issued by the Edison Electric Company of Los Angeles, the issue having been made necessary by the recent sale by the Southern California Edison of certain of its electric holdings to the city of Pasadena.

ANOTHER ELECTRICAL HOME OPENED

The third Electrical Home in California was opened in Oakland on August 26th with some fifty invited guests at the pleasant ceremony. Mr. Gregory of the East Bay Electrical Trades Association presided at the meeting, which was addressed by Robert Sibley, editor of the Journal of Electricity, as well as by a representative of the Oakland Chamber of commerce. A program of music in which an electrically operated piano played an important part completed the exercises.


A Booklet describing in detail The Modern Home Electrical is in course of publication. You, no doubt, will wish a copy so kindly fill out this card plainly and leave it in the box in the garage.
Name
Address
City

Most of those who attended the exhibit at the Oakland Electrical Home wished to receive the booklet which the East Bay Trades Association is issuing and in consequence left their names and address. Not only does this provide a proper follow-up of the electrical idea, but a record of attendance is thus obtained in the most advantageous way.

The Electrical Home had been well advertised and by ten o'clock in the morning automobiles and foot passengers began to arrive in numbers. Especially effective provision has been made for bringing people to the house. Large red arrows direct those interested from all parts of town and conductors on street cars running to the district are instructed with the necessary information for their passengers.

The house is well designed and attractively outfitted, both in the furnishings and the electrical equipment. The convenience outlet is particularly well featured, there being some sixty outlets in the various rooms of the home.

Great interest has been shown both by the press and the public at large and it is expected that the success of the previous Electrical Homes will be duplicated.

N. E. L. A. WATER POWER COMMITTEE ACTING WITH FEDERAL COMMITTEE

Franklin T. Griffith, president of the Portland Railway Light & Power Company, Portland, Ore., and chairman of the committee on water power development of the National Electric Light Association, has just returned from Washington, D. C., with Guy W. Talbot, president of the Pacific Power & Light Company, Portland, Ore., where they attended a conference with the federal water power commission.

This commission, composed of the Secretary of the Interior, the Secretary of War and the Secretary of Agriculture, was created by act of Congress in the early part of the summer, to formulate rules and regulations under which permits and licenses for water power development may be issued.

These rules and regulations determine the terms and conditions under which federal lands may be occupied, the character and extent of development to be made, the charges of the government for permits and also for the use of federal lands, the time within which development shall be completed,

Seventy per cent of the nation's water powers are located west of the Rocky Mountains. Power development awaits the demand for it.

FORWARD WESTERN INDUSTRY!

the use to which the power shall be put and also many questions involving accounting, operation and finance.

On the assumption that the water power committee of the N. E. L. A. could be of assistance in offering suggestions as to the practical workings of rules and regulations, the federal power commission summoned the committee to Washington, where the members have been in conference for the past several weeks with the federal water power commission and its executive staff.

There is an apparent disposition on the part of the federal water power commission to make the Act really workable, with full safeguards for the national interests, and to provide a system of development and operation that will at once afford the best and cheapest service to the public. Combined with this is the desire for such stability of investment in water power developments as will enable the companies to make such developments and obtain the necessary money at reasonable rates, because of the assurance of return and security.

STAND-BY CHARGE IN RECLAMATION SERVICE PROPOSED IN CALIFORNIA

In connection with the schedule of rates for electricity sold to reclamation districts, an order was issued on Aug. 30 by the Railroad Commission of the state of California, designed to cover variable conditions resultant from the use of energy by the different districts. According to the Commission, its effect will be to place all districts on an equal footing so far as rates are concerned and to require them to pay a stand-by charge. The Commission holds that reclamation service is primarily an insurance service, the average consumption per horsepower per year being very low.

ELECTRIC DREADNAUGHT WINS ECONOMY TRIALS

Final proof of the practicability and surpassing efficiency of the new type electrically-driven dreadnaught was given by marine engineers and naval authorities when Admiral Hugh Rodman, commander-in-chief of the Pacific fleet, was notified by dispatch from the Navy Department that the New Mexico, the only dreadnaught propelled by an electric motor, had won the economy steaming test in competition with all major ships of the United States Navy.

The dreadnaught New Mexico, now on the Pacific Coast, is propelled by turbine generators which supply electrical energy to motors directly connected with propeller shafts.

N. E. L. A. ADVANCED ACCOUNTING COURSE

In order to introduce thoroughly throughout member companies its advanced accounting course, the National Electric Light Association has reduced the price thereof from $65 to $40.

It is expected that a great many of the member companies will take advantage of this opportunity to establish classes in advanced accounting. This course consists of thirty-six lessons and follows carefully the best practices of progressive light and power companies.

The price of the elementary accounting course remains the same as formerly, the complete course costing $16, and groups of ten or more sent in at one time $14 per course. For the benefit of the industry as a whole the association last year removed all the restrictions as to enrolment in these courses, and they are now open to all those who may apply at the regular association prices.

WANTED—Copies of November 15, 1919, issue of Journal of Electricity. Twenty-five cents will be paid for each copy sent to this office.

CONSTRUCTION UNDER WAY ON EXTENSIVE PIT RIVER POWER PROJECT

The Mt. Shasta Power Corporation, whose stock is owned by the Pacific Gas & Electric Company, has applied to the California Railroad Commission for a certificate declaring that public convenience and necessity require the development by the company of the Pit River project in Northern California. This application was heard on Sept. 2 and the case was taken under submission. John A. Britton, general manager of the company, recently told the commission that his company has plans for hydroelectric power developments to cost a total of about $125,000,000, divided equally between power plants and distributing systems.

The chain of developments in the Pit River region is to be carried out first. This work will involve seven plants, of which four are to be constructed now and the remainder as may be necessary.

Work started in July on two of the first four plants. These are known as Hat Creek No. 1 and No. 2 and they are to be finished by January 1, 1921. These require no storage and only small diversion weirs will be used for diverting the flow. No. 1 will have 2400 ft. of canal and 1750 ft. of penstock, developing 9300 hp. on a 215-ft. head. No. 2, with a 4750-ft. flume and a 400-ft. penstock, is to develop 12,300 hp. on a head of 195 ft.

The next two plants, Fall Creek No. 1 and No. 2, are just being started. They are to be completed in August, 1921. No. 1 requires 10,000 ft. of 14-ft. tunnel, from which a short penstock will develop a 430-ft. head, giving 60,000 hp. No. 2 will take the tailrace water from No. 1 via a flume line to a point farther downstream, when a drop of 100 ft. can be utilized to develop 18,000 hp. This makes a total of 99,000 hp. to be available by next fall from these four plants, all grouped closely together.

The three other plants, not to be constructed just yet, are all farther down on Pit River, and are to be known as Pit River Plants No. 1, No. 2, and No. 4. No. 3 is an alternate plant not now being considered. No. 1 will have a 100-ft. dam and a tunnel line, developing 72,000 hp. on a 300-ft. head. No. 2 is to take tailrace water from No. 1 and after traversing a tunnel, develop 42,000 hp. on a 185-ft. head. No. 4 is to take the No. 2 tailrace water and after traversing a 7-mile tunnel, 20 ft. in diameter, develop a head of 932 ft. in a plant where the installed capacity is to be 232,000 hp. If present plans are to be carried out, the latter plant would have water turbines of record size. The units would be single runner vertical shaft type rated between 60,000 and 75,000 hp.

In all seven of these plants the water wheels are to be of the same type—vertical, single-runner units. The flow in the Pit basin is remarkably uniform; the seasonal variation on Hat Creek at No. 1, for example, does not exceed the range of 450 to 600 sec.-ft. At first the 60,000-volt transmission line of the California-Oregon Power Company is to be used to deliver the power from these plants, but later on a two-circuit, 220,000-volt line is to be built all the way to San Francisco.

WASHINGTON STATE FILES POWER SITE TO PROTECT PRIORITY RIGHTS

What is believed by members of the Reclamation Board of the state of Washington to be the first instance on record of a state filing on a power site, is the action of that board in notifying the federal power commission of its purpose to take steps to protect its priority rights to a power site at Five Mile Rapids on the Snake River in that state. The board has expended over $10,000 in investigating the site which, it declares, will be most serviceable if developed in irrigating 60,000 acres of land in Franklin and 40,000 acres in Walla Walla county.

TRADE NOTES

Motor Company Opens Western Offices —

The Electro Dynamic Company of Bayonne, New Jersey, are opening offices in San Francisco, Los Angeles, Portland and Seattle. The business on the Pacific Coast and in Arizona and Nevada will be under the supervision of Coast Equipment Company, L. A. Somers, managing director. The Coast Equipment Company has arranged for Messrs. Conway and McCalley to handle their business in Oregon. Offices will be maintained in the Lewis Building, Portland.

New Manager of Utah Company —

John J. Crowe, for the past year sales manager for the Intermountain Electric Company, has resigned to become general manager of the Utah Electric & Motor Equipment Company.

Previous to his connection with the Intermountain Electric Company, Mr. Crowe was for six years a machinery salesman with the Salt Lake Hardware Company. Before that he was for five years purchasing agent with the Capital Electric Company of this city.

The Utah Electric & Motor Equipment Company is one of the most completely equipped retail stores in the Intermountain west for the sale of electrical appliances, supplies and equipment and automobile accessories and supplies.

The floor space occupied by this Company was recently doubled in size, and other changes have been effected which provide complete facilities for serving the company's large trade.

Change in Sales Department —

The St. Louis Electrical Works of St. Louis announce that they have added to their staff Mr. J. F. Jones as sales manager. J. C. Grindell, former Seattle manager of this company, is now in St. Louis in the sales department. After conditions improve so that they can again make deliveries in better shape, Mr. Grindell will go back to Seattle.

Western Distributors —

The Estate Stove Company have recently established connections with distributors who cover western territory as follows: Listenwalter & Gough, Inc., Los Angeles, Cal., distributors for lower California and Arizona; Alexander and Lavenson Electric Supply Company, San Francisco, distributors for upper California and Nevada, and North Coast Electric Company, Seattle, Portland and Tacoma, distributors for Alaska, Washington, Oregon and northern Idaho.

Book and Bulletins

Engineers Unite

The last word on the much discussed organization of The Federated American Engineering Societies is given in a pamphlet which has been published and contributed by the McGraw-Hill Company, Inc., as an expression of its interest in this forward movement among engineers. The pamphlet consists of reprints of news articles and editorials from the pages of the publications of the societies and the engineering and industrial journals.

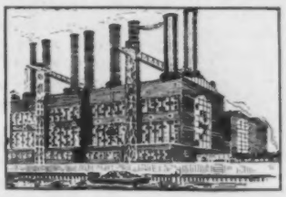
Because the editor of each journal saw the recent Conference at Washington through his own eyes, and with reference to the particular field of engineering which his paper covers, the interpretative editorials in this pamphlet taken from the different journals, as well as the news stories, give a cross section of the Organizing Conference, which perhaps could not be obtained in any other manner.

Novalux Ornamental Street Lighting Units

"A well dressed city, like a well dressed man, commands attention and respect," is the keynote sentence to the beautiful street lighting booklet which has been published by the General Electric Company. Illustrations of the many artistically designed lighting units fill the first part of the booklet while the latter part contains views of city streets now using these units.

Proposed Super-Power Central Station

An unusually fascinating booklet is the result of reprints of the articles by John A. Stevens which appeared in the May 25 and June 1, 1920, issues of "Power." Mr. Stevens is a consulting engineer for power plant construction with offices in Lowell, Massachusetts.



The sketch of the proposed super-power central station. This appeared as the cover illustration of the recent booklet which presents the subject with all its fascinating details.

This booklet sets forth in an interesting manner and with the aid of charts and diagrams, the proposed design of a super-power station built with multiples of 30,000-kw. units up to a total capacity of 100,000, 300,000 or even 500,000 kw. Each unit consists of four 1,716-hp. boilers, normal rating, served by one stack centrally located, and supplying steam to one 30,000-kw. turbine.

It is planned that all boiler houses will be separated from their turbine rooms by an explosion gap, and the turbine rooms are separated by explosion walls.

The reader feels that he is getting a glimpse well into the future when he goes on to read of the main operating room which is to be located at the top of this super-structure, together with sleeping quarters for the men, baths and showers, telephones, searchlight, alarm whistles and wireless apparatus.

Self-Supporting Chimneys to Withstand Earthquake

An article under this title, by C. R. Weymouth, chief engineer, Charles C. Moore & Company, appears in the March issue of Mechanical Engineering, the journal of the American Society of Mechanical Engineers.

This article is noteworthy because of its discussion of the nature of stresses on chimneys developed by seismic shocks, because of its presentation of the theory of design of chimneys to withstand such stresses and because of the particulars which it gives regarding chimneys in which this theory has been applied.

The author summarizes the studies of the Japanese Imperial Investigation Committee on the nature of the stresses developed in chimneys in consequence of earthquakes and further examines the conclusions of this committee in the light of data on chimney failures which has been secured from inspection of the wrecks caused from the San Francisco earthquake in 1906.

An advancement to the theory which has been developed by Professor Omori, chairman of the Japanese committee, on the design of chimneys to withstand earthquakes, is presented. This new theory assumes that the chimney should not be looked upon as rigid but rather as a body oscillating about the center of percussion. The various chimneys where this theory has been applied are referred to.

The cost of electricity to the consumer is lower in the West than in any other district of the country.

FORWARD WESTERN INDUSTRY!

NEW ELECTRICAL DEVELOPMENT

(The Northwest is actively promoting the financial interest necessary for the carrying out of its new construction work. In the Pacific Central District improvements in water supply constitute an important question; also in the Southwest, where new pumping installations and irrigation developments are reported. New plans for extensive water storage are featured in the Inter-Mountain news.—The Editor.)

THE PACIFIC NORTHWEST

BEND, ORE.—The plans for the first unit of the Bend Water, Light & Power Company, on Tumalo, are now in the hands of the state engineer and the plant will be in shape for business by the latter part of 1921.

SALEM, ORE.—Ninety-one permits for the appropriation of water from Oregon streams, the irrigation of 3,129 acres of land, and three permits for the construction of reservoirs were issued by the state engineer during the months of June and July.

MARSHFIELD, ORE. — Work on the new United States Navy wireless station to be erected on the north side of Coos Bay is to be rushed. This station is to be operated entirely independent of the present government wireless station now in operation in Marshfield, and is designed for the express purpose of assisting mariners when they lose their bearings.

SEATTLE, WASH.—A moving picture theater of fireproof construction which will rival most of the Northwest's finest show houses will be erected at once. The architecture will be of the modern Italian Renaissance type and attractive flower gardens are included in the plans of the architect. A complete heating and ventilating plant is to be installed. It is stated that the seating capacity will be 1400 persons.

SALEM, ORE.—A direct appropriation of $250,000 on government credit in an equal amount under what is known as the Smith-Fletcher bill now pending before Congress will be sought by the executive committee of the Western States Reclamation Association, which met in Salt Lake City recently, according to Percy Cupper, state engineer, who attended the conference.

SALEM, ORE.—Application has recently been filed with the state engineer requesting state guarantee of interest on bonds in the sum of approximately $250,000 voted by the Talent irrigation district. The district has authorized bonds amounting to more than $600,000, but only $250,000 of the securities have been sold. The application will come up at the next meeting of the irrigation securities commission.

SCIO, ORE.—Work is being pushed on the new $40,000 municipal electric plant. A large dam is being constructed to hold the waters of Thomas Creek, the water to be carried one mile through a flume having a fall of 68 feet and developing 326 hp. at the lowest stage of the water. The power generated will be transmitted to Scio and there used to supply the light and power needs of the city and to operate the water plant.

SEATTLE, WASH.—The completion by the city architect of plans and specifications for the new Cedar Falls power house designed to accommodate the necessary machinery to develop 20,000 additional horsepower marks the last step preparatory to beginning actual construction work on this much needed unit, figured to cost $1,000,000. Plans will be presented to the board of public works for approval and inasmuch as the board members have been kept fully advised as to progress being made on the plans, the approval of this body is expected.

SALEM, ORE.—An extensive development of power on the south fork of the Coquille river is contemplated by M. J. Anderson, of Portland, and his application for a permit to appropriate the water has been filed with the state engineer. The construction of a reservoir for the storage of 18,700 acre-feet of water and a tunnel and a pipe line about three miles long for the appropriation of 75 second-feet of water under a head of 1556 feet, which will develop 13,000 theoretical horsepower, are contemplated. The cost of the development is estimated at $750,000.

PORTLAND, ORE.—Charles B. Hall of Prosser, Wash., was a Portland visitor for the purpose of bringing to the attention of the Portland Chamber of Commerce plans for development of a big irrigation project in the Horse Heaven district of Washington. The appropriation of water for the system is from the flow of the Klickitat river on its headwaters near Mount Adams, and would be conveyed to the land by a main canal 125 miles long. The estimated cost for the entire project is more than $18,000,000, which it is proposed to raise through the sale of municipal irrigation district bonds.

THE PACIFIC CENTRAL DISTRICT

MANTECA, CAL.—The Manteca water works has just completed another well which will enable the installation of additional machinery for the water system in Manteca.

SANTA CRUZ, CAL.—The corporate name of the Boulder Creek Electric Light and Water Company having been changed to Santa Cruz County Utilities the Railroad Commission, in a supplemental order, changes its recent order permitting the company to issue bonds and stocks so as to convey the authority to the Santa Cruz County Utilities.

COLUSA, CAL.—Owners of 9000 acres of land across the river from Colusa have completed the dredging of a drainage ditch as far as the Sacramento river, and the dredge is now making its way back to the north end of the ditch, where a two-mile lateral will be dug. The project was established by the Colusa Delta Farms and other owners on the east side.

SANTA CRUZ, CAL.—An option has been taken on 16 acres of ground for a reservoir site near Bay Street, on the brow of Escalona Heights. The cost of preparing a reservoir for water and building a dam will be $50,000. The proposed reservoir will impound 12,000,000 gallons of water. A quarter of a mile of pipe will have to be laid, to connect with Majors Creek.

VALLEJO, CAL.—The city council of Vallejo took the final step prior to the calling of a bond election for $1,250,000 to finance the Gordon Valley water project as a future water supply of this city, when it instructed City Engineer T. D. Kilkenny to prepare final plans and cost estimates for the purchase of the necessary rights-of-way and construction of the system.

SACRAMENTO, CAL.—Sealed bids will be received up to 11 a.m. Sept. 30 for furnishing transformers, sluice gates, centrifugal pumps, induction motors, intake and pumping works, electric crane for pumping and filtration works. Bids must be on forms from H. J. Desmond, clerk. A certified check for 10 per cent is required. Separate bids will be received on various segregated parts of the work.

SAN FRANCISCO, CAL.—A convention of radio manufacturers, the initial conference of its kind on this coast, will be held in San Francisco in the latter part of October, it was announced by the San Francisco Radio Club. The three-days' session will open with an address over a radio telephone to the convention hall. The instrument will be installed by the De Forrest Radio Telephone and Telegraph Company, under the supervision of R. M. Klein.

OROVILLE, CAL.—Directors of Honcut Yuba irrigation district have adopted a plan to take care of 30,000 acres. The plans will now go to State Engineer McClure. Later, a bond election will be called. The total cost will be $1,780,636. The flumes will be of metal and the syphons and weirs of reinforced concrete. A hydraulic filled dam is recommended for Virginia ranch reservoir. The pumping station is designed for a capacity of 300 second-feet.

WILLOWS, CAL. — A committee appointed jointly by the Chamber of Commerce and the board of trustees to inquire into the adequacy of the present water supply has asked the town trustees to employ an engineer to place a physical valuation on the water plant of the Pacific Gas & Electric Company with a view of acquiring it as a basis for a municipal water plant.

CORCORAN, CAL.—Sealed bids will be received until 10 a.m. September 18 for construction of canals, ditches, etc., in the Corcoran irrigation district.

STOCKTON, CAL.—Issuance of bonds to the amount of $3,004,396 for a municipal water supply system and flood protection for Stockton is recommended in a report submitted to the city council by Fred H. Tibbetts, consulting engineer retained by the city to investigate sources of water supply for the city of Stockton. The report covers a survey of the Calaveras flood control project and embodies as an appendix a previous report by Tibbetts on the water system of the Pacific Gas & Electric Company, which supplies Stockton.

BAY POINT, CAL.—The Bay Point Light & Power Company was given an increase in rates for electric service approximating 25 per cent by the Railroad Commission on Aug. 24. In its application for an increase in rates, the company requested the Commission to allow it to charge the same rates that the Great Western Power Company and the Pacific Gas & Electric Company charge in adjacent territory. The applicant purchases current from the Great Western Power Company and operates a distributing system in the towns of Bay Point and Clyde and adjacent territory, serving in excess of 400 consumers. The gross operating revenue increased from 7,540 in 1917 to 919,223 in 1919, during which time many new industries located at Bay Point, among them being the Pacific Coast Shipbuilding Company. Fixed capital increased from 28,955 to 038,961 in the same time. It is estimated by the Bay Point Company that the increased power charges for 1920 would approximate $3,000, due to the 15 per cent surcharge that the Commission granted the Great Western Power Company on July 10. The order of the Commission states that it finds the existing rates of the company unjust, unreasonable and inadequate so far as they differ from rates and surcharges hereafter to be charged, which the Commission finds to be just and reasonable rates. Besides bringing the regular rates up to the same as charged by the larger companies, a surcharge of 15 per cent is to be added. This surcharge is to be in effect until May 24, 1921.

THE PACIFIC SOUTHWEST

LA VERNE, CAL.—Hanawalt Bros. have been awarded the contract for building the reservoir at Monrovia, at $17,500, also the contract for the construction of the reservoir at Arcadia.

ST. JOHNS, ARIZ.—Contracts for about 15 miles of canal extension work for the Lyman Water Company have been let to local parties for approximately $112,000. There were many bidders on the work, which was divided into sections.

PHOENIX, ARIZ.—City Manager Thompson has placed before the city council a proposal for the popular election to authorize $1,000,000 in bonds for improvements and extensions of water, fire, sewer and park systems, and additions to the city hall, new jail, and paving.

ARLINGTON, CAL.—Work has been commenced by the Twin Buttes Water Company on laying a pipe line from West Riverside canal to carry 300 inches of irrigating water to La Sierra Heights section. This is the first unit of the $60,000 irrigation system to be added to the Twin Buttes holdings.

SANTA ANA, CAL.—C. E. Treat, president and manager of the T & W Manufacturing Co., is laying plans for the construction of a factory in Los Angeles to cost about $35,000. The site has not as yet been decided upon. Treat is the inventor of an adjustable electric plug known as the T & W Universal Plug. His company is incorporated and capitalized for $150,000.

RIVERSIDE, CAL. — Engineer Lee Nafzgar has submitted tentative plans for the installation of a pumping plant to supply water for Rubidoux reservoir at a minimum cost of $57,671, which provides for the installation of a first-class plant of two units, with two turbine pumps capable of developing 300 inches, and for the laying of 10-in. pipe to the reservoir at Mt. Rubidoux.

LOS ANGELES, CAL.—A survey of dam sites and canal lines, planned in the big scheme of harnessing the mountain floods of the Colorado river to provide water for irrigation of more than 2,000,000 acres of land, has actually commenced, as announced by W. W. Schlecht, who is managing the survey of the U. S. Reclamation Service. Mr. Schlecht has left for Boulder Canyon reservoir site to undertake preparations for this engineering feat.

LOS ANGELES, CAL.—The directors of Van Nuys board of trade have conferred with the Supervisors and an agreement has been reached whereby the location of the Hutchins Dam in Paroima Canyon was moved to the Narrows, about two miles below the Hutchins farm. In the bond issue for flood control, $359,000 was provided for dam construction. The dam at the new location will be 350 ft. high and 500 ft. across the top, and will impound 9,800 acre-ft. of water.

LOS ANGELES, CAL. — Ross Construction Company of Sacramento and Los Angeles was the only bidder, at a total of about $81,224.80, for constructing the Live Oak Canyon concrete dam about three miles northeast of LaVerne for the Los Angeles County Flood Control District. The dam as planned is to be a simple arch type about 260 ft. long on top, 86 ft. high above bedrock, 47 ft. thick at base and 6 ft. thick at top. It will have a 20-ft. wide spillway and 36-in. pipe sluiceway, and will impound about 350 acre-ft. of water.

LOS ANGELES, CAL.—An order by the Railroad Commission authorizes the Southern California Edison Company to issue, on or before December 31, 1920, $438,000 face value of its general and refunding mortgage 6 per cent 25-year gold bonds of the series of 1919. The bonds or the proceeds are to be used to pay or refund bonds issued by the Edison Electric Company of Los Angeles, the issue having been made necessary by the recent sale by the Southern California Edison of certain of its electric holdings to the city of Pasadena.

OWENSMOUTH, CAL.—An extension of the Pacific Electric line from Owensmouth to Chatsworth is contemplated.

THE INTER-MOUNTAIN DISTRICT

RUPERT, IDA.—The light and power system has been cut over to a new connection at the transformers and substation. The delta connection now in use does away with grounded wires and is more efficient than the former distributing system.

LOGAN, UTAH.—Plans are under way for the drainage of 100,000 acres of land between Wellsville, Cache county, and the northern boundary of the state of Utah, according to R. A. Hart, in charge of the western federal drainage investigations.

DELTA, UTAH.—The Deseret Power Company has filed articles of incorporation with the secretary of state of Utah. Its capital is $200,000, divided into shares of $1 each. H. G. Maxfield is president; Marcus Skeen, vice-president; E. W. Jeffery, secretary and treasurer.

MILES CITY, MONT.—A $500,000 corporation to irrigate 75,000 acres of land between Glendive and Forsyth, and deal in land and generate power for general purposes, but especially for carrying out the irrigation plan, is being promoted by the Yellowstone Irrigation Company.

EUREKA, UTAH.—The North Standard Mining Company is installing a new electric motor, which is much larger than the one formerly in use, and which will be large enough to carry the shaft down to any depth. Just as soon as this new motor is installed, the operation of sinking the shaft will be pushed rapidly.

LOGAN, UTAH.—The irrigation and drainage department of the Utah Agricultural College is enlarging its facilities. A new laboratory will be put into use for the first time this fall, which is designed to study soil and water in relation to irrigation projects, with special attention paid to the rate of movement of water through soils of different textures.

OGDEN, UTAH.—Fifteen canning factories of northern Utah, practically all of which are operated electrically, have started operations for the fall canning season. About twenty other plants, located in other parts of the state, have also completed plans for opening their fall season of operations, and will all begin operations during the early part of September.

BRIGHAM, UTAH.—Brigham City has voted a $200,000 bond issue for the rebuilding and enlarging of the municipal power plant in Box-elder Canyon, at a special election held August 31st. The present capacity of the municipal plant is between 300 and 400 horsepower. It will be increased to 100 horsepower. Work will begin on the plant as soon as the bonds are sold.

BOISE, IDA.—Jensen and Von Herberg, owners of moving picture theaters in Oregon, Washington, Idaho and Montana, and the Independent Booking Company are investigating the possibilities of establishing a moving picture theater at Boise to cost approximately $600,000. The plans for the proposed theater call for a modern and entirely new type of moving picture theater construction.

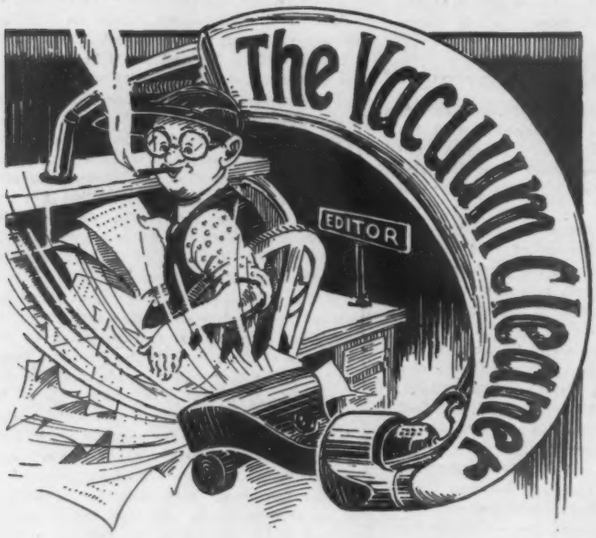
MALAD, IDA.—A case that will be watched with interest by the people of Idaho has just been filed with the public utilities commission of Idaho. The Nez Perce Telephone Company of this place alleges that the Grangerville Electric Company has constructed five miles of electric lines parallel to the telephone company's line, and in such proximity as to render the telephone company's lines worthless on account of inductive interference. The telephone company asks the commission to order the removal of the electric power line.

SALT LAKE CITY, UTAH.—Upon his return from the League of the Southwest conference in Denver recently, Governor Simon Bamberger told of a plan outlined by Arthur Powell Davis, director general of the United States Reclamation Service, which comprehends the building of a dam in Boulder canyon where an immense quantity of water can be stored. This would cost about $20,000,000 and would be the largest dam in the world. Its capacity would be 240,000,000 acre-feet of water. It would take care of 10,000,000 acre-ft. of silt which are annually brought down the Colorado. The storing of such immense quantities of water would develop great water-power energy, that near Green river producing about 290,000 horsepower. This in a few years, according to Mr. Davis, would become more important than the water impounded. It was estimated that the Colorado produces 2,666,000 horsepower, now unused.

PROVO, UTAH.—Preliminary plans have been launched for the formation of a new irrigation district in Utah county, and according to the declaration of those back of the project, a large area of fertile land will be made available for agricultural purposes. The project is to be known as the Santaquin irrigation district, and it is proposed to secure the required water supply from the Strawberry Valley project and Summit Creek. A petition has been prepared to Governor Bamberger, requesting him to petition the county commissioners of Utah county to list the land to be included in the district, and to make required land and water allotments. In the event of favorable action by the commissioners of Utah county on the petition to be submitted by Governor Bamberger, an accurate survey of the district will be made and the proposition will be referred to the voters of the district for approval.

BOISE, IDA.—The government has entered into a contract with the Emmett irrigation district whereby the district can build a diversion dam at a point known as the Black canyon of the Payette river, six miles northeast of Emmett. The closing of this deal is a matter of great importance, not only to the Emmett district, but also to Boise, Caldwell, Nampa and every town in the Boise valley, as well as eastern Oregon. It is the first important step taken by the government toward the development of the Black canyon irrigation district, comprising 90,000 acres of land. The proposed dam will be 90 feet high, 300 feet long and have a 700-ft. spillway. In the contract entered into the government reserves the right to use the dam to divert water from the Payette river to the district at any time either by the government or the Black canyon district or by both. The government agrees to pay its proportionate share of the cost of construction. Half of the land in the district can be irrigated by pumping and half by gravity.

POCATELLO, IDA.—The most important irrigation venture is being talked of at Hailey. Diversion of the waters of Alturas lake and upper Salmon river into Big Wood river to assure a more steady supply for irrigation purposes is discussed. The work is being backed by the Idaho Development and Exploitation Company. The company proposes to construct a dam across the lower end of Alturas lake, thereby utilizing one of the largest natural reservoirs in the country. This water will not be needed until the last of July, 1921. From Alturas lake the company plans to construct a canal to the Salmon river, picking up the waters of smaller creeks on the way. When this canal reaches Salmon river it is planned to tunnel straight through the mountain and empty the water out into the headwaters of Wood river. Should this plan be perfected large reservoirs will be installed at intervals along the river to store the supply until it is needed. The construction of such a system of supply will prove to be a great asset to the country dependent upon Wood river for its supply, and the majority of the people in that section are in sympathy with the movement. No further steps will be taken in the project until a report is received from the engineers who are investigating it.



Apropos of some bright discoveries about misleading terms that we published a short time ago, someone else has got delirious on the subject and contributes the following:

"Monkey-wrenches are neither made by or of monkeys, and ottar of roses is not extracted from the otter. Poles are not made by pole-cats or badges by the badger.

"A lathe chuck is a contrivance fixed to the mandrel to hold the wood—it is not a wood-chuck. A wood-chuck is a ground-hog, which is not a hog and is not ground—ground hog is sausage. And a lathe mandrel is not a monkey, though a mandrill is.

"Angel-food is eaten by everybody. There are no sponges in sponge-cake, and the eating of lady-fingers does not imply cannibalism any more than taking a buggy ride implies what it might if everyone were always literal.

"Chicken-pox has nothing to do with chickens, neither has egg-plant—nor a cocktail.

"A horse-chestnut is as far removed from horses as a saw-horse, clothes-horse, or a horse-radish. A horse-chestnut is a nut, so is the thing that goes with a bolt, so is a doughnut.

"Sweetbreads are neither sweet nor bread.

"Walnuts grow on trees, not on walls.

"Chess-men are not men. There is no soda in soda-water. Wax-beans are not wax. Highballs do not roll about, and biographies are not written by biographs.

"Catgut is no more feline than pussy-willow, or cat-tails, and fire-dogs are andirons and are made frequently of brass, and a copper is a policeman or a bull, but an Irish policeman is not an Irish bull.

"Whiffle-trees, boot-trees, hall-trees and family trees are as out of place in the woods as a railway-frog, a fish-plate, a fish story, a mackerel sky or a crabapple in the water."

Personally, we think this has gone far enough. We've reached the stage where we spend all our spare time thinking of things like this.

* * *

Lucidity always appeals to us, which accounts for our reproducing the following from the San Francisco Chronicle,—part of a letter inspired by an article on sun spots:—

Permit me also to refer to the moon rays, noctuary invisible to the naked eye, on account of the supreme volatileness of their illipticity. These rays also greatly influence the nocturnal evolution of the earth and its fructification after it returns to its epi-zoroastric revolutions or normal position. The elligation of the surface of the earth is of a quasi non-perceptible displacement on account of the continual cosmogony deviation of its axis during the daylight period, the moon's cerestonic rays at night correct this. The moon reacts or counter-balances the elucidal attraction or drawing power of the sun during the day, for she retaliates, if I may use the expression, upon the effects of the attributal sun power or upon the effects of the zoroastric nebula, engendered through the variegated sunbeams, occasioned by the sun spots. The moon is of super influence and shows this through a thorough study of its translucence course. Excuse this rather dry explanation, but the initiated will clearly comprehend.

The only way to get rid of temptation is to yield to it, said some one who had evidently attended summer sales. Anyone who has ever bought two tooth brushes because they were fifty cents each and two for ninety-five cents will appreciate the following plaintive ballad by a victim of the bargain habit.

A SONG OF SUMMER SALES

There's a crowd of people giving
Hints about the cost of living,
There's advice on sandwich boards and office doors;
There's a car card that implores you
To invest the cash that bores you
And "the Joy of Clipping Coupons will be yours."

But though everything is double
And a dollar's but a bubble,
And I'm swamped with pamphlets advertising thrift,
While the summer sales are calling
I'm continually falling
At the counters where the bargain-hunters drift.

I've bought presents for my cousins,
And engagement gifts by dozens
For the couples who have just been introduced;
I've bought towels and nutmeg graters
And electric percolators
And anything that's ten-per-cent reduced.

When the summer sales are ended
And my final dime's expended
And the stores display their 'newest autumn line'
A thrift stamp I shall borrow
To dispel my summer sorrow,
And the Joy of Clipping Coupons will be mine.

* * *

The H. C. L. does not seem to be affecting some people. The other day we saw a newspaper heading which read:

"$3600 SUIT IN MOTOR CYCLE ACCIDENT"

We don't pay that for our dress suit even now, and if we did we should use an old one for motor cycling.

* * *

A discussion on home lighting was recently reported in part as follows:

One of the members spoke of the air of coziness given to a room by a portable lamp and added, "I have in mind a room of about 16 by 40 which was used by three people. With ceiling lights turned on, we were lost in the place. If we wanted to play cards in the corner we used a wall bracket and portable standard. One other interesting point for convenience, all of the wall switches instead of being inside the room were outside the room and on the same side of the door as the door knob. If you went into the bathroom, you turned on the light before you went in. This scheme worked out very satisfactorily."

That is all very nice with the exception of the location of the switches. Evidently the speaker is an only child, but as for us we have a small brother who long ago discovered the infinite possibilities of a switch located outside a bathroom door, when the bather within has just lost the soap.

* * *

Unnecessary frankness seems to characterize some modern advertising. A recent export advertisement in a trade paper reads:

"CEYLON SKINS AND HIDES"

If we did that we'd keep it dark.

* * *

A new item has been added to the Ancient Compilation of Useless Statistics. We read that "the streets of Greater New York, if extended in one continuous line, would reach almost across the American continent." Some day we are planning to get out a book of useless statistics, but there are still a number of items lacking in our data. We should like to know how many matches placed end to end would reach from here to Mars; how many times around the earth the world's supply of shoe laces would reach; how many thumb tacks could be made of the metal in a battleship, and how long it would take the average mackerel to swim from the North to the South pole. If anyone has already worked these out—and from all indications it is highly probable—we should be extremely glad to have them for our collection.